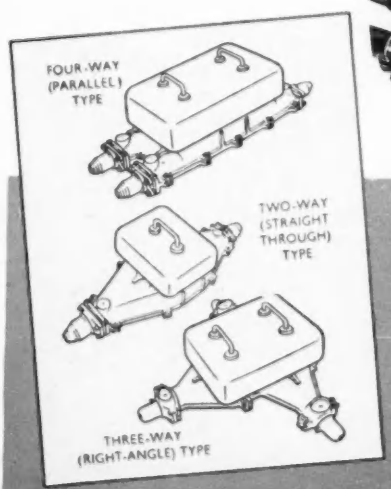
ELECTRICAL TIMES

THURSDAY
22 JAN.
1953
NINEPENCE

The large numbers of Henley Underground Disconnecting Boxes giving satisfactory service, at home and overseas, is proof of their reliability.

Full details of the wide range available are given in Henley Catalogue 27.



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W. T. HENLEY'S TELEGRAPH WORKS CO. LTD. 51-53 HATTON GARDEN, LONDON, E.C.1

MICANITE TUBES FOR ELECTRICAL INSTALLATIONS

We have been manufacturing Micanite tubes for fifty years. With the most up-to-date equipment and our long experience we are able to supply any of the requirements of the Electrical Industry.

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High voltage distribution up to 11 kV

Designed for electricity supply authorities and industrial consumers, 'ENGLISH ELECTRIC' type OLX air-insulated, oil circuit breakers are available up to 800 amps rating. They are A.S.T.A. certified for breaking capacities up to and including 250 MVA at 6.6 and 11kV.

The type OLX switchboard illustrated is installed at the Neston Works of Morgan Crucible Co. Ltd. Unit construction ensures easy extension, while all parts of similar pillars are interchangeable. Circuit breakers and oil switches can be arranged in any combination.

'ENGLISH ELECTRIC' type OLX circuit breakers are designed for safe and consistent operation, for reliability under all conditions of service with the minimum initial cost.

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Specify **"KEW COVERED"** for dependability through the years

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You cannot buy better gear

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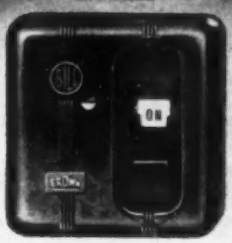

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DESIGNED FOR SP/N CIRCUITS.
SLOW BREAK A.C. SWITCH.
OPERATED FROM THE FRONT.
ALL-INSULATED AND METAL CLAD.
FOR 15 & 30 AMPERES 250 VOLTS.
DETAILS ON REQUEST.

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But do you know how well it cooks, and how much it cooks? Just look at this for a meal—

Soup	*Roast Potatoes*
2 lb. Joint of Roast Beef	*Cauliflower, Carrots*
Yorkshire Pudding	*Fruit Pie & Custard*

—all cooked easily and quickly on this marvellous little cooker for less than 2d. (at 1d. per unit). It's just the thing for the small home, with only one or two people (and there are 5½ million such homes in this country, according to the 1951 Census figures).
We are starting a big national advertising campaign this month so make sure you've got a "Wee Baby" in your window and one on the counter as well, and if you would like some more show cards or leaflets, just let us know.

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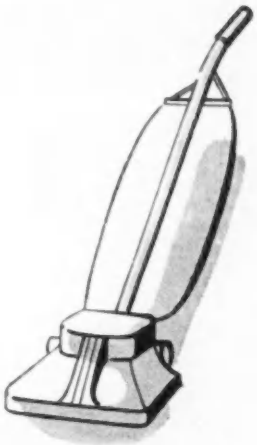
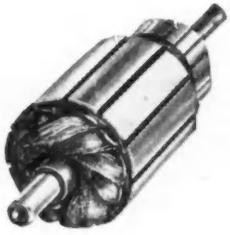


with

"BICALEX" Winding Wire



It's the synthetic enamel covering that keeps "BICALEX" Winding Wires so reliable — for so long. They're ideal for high-speed winding... for jobs where abrasions are sometimes unavoidable. You can stretch, twist, and even flatten "BICALEX" Wire without damaging the insulation. No wonder it is used in some of the best vacuum cleaners, washing machines, and other domestic appliances built for long service.

May we send you details of the types and range of "BICALEX" Winding Wires in Publication No. 322

BICC MAKE WINDING WIRES AND STRIP FOR EVERY ELECTRICAL PURPOSE.

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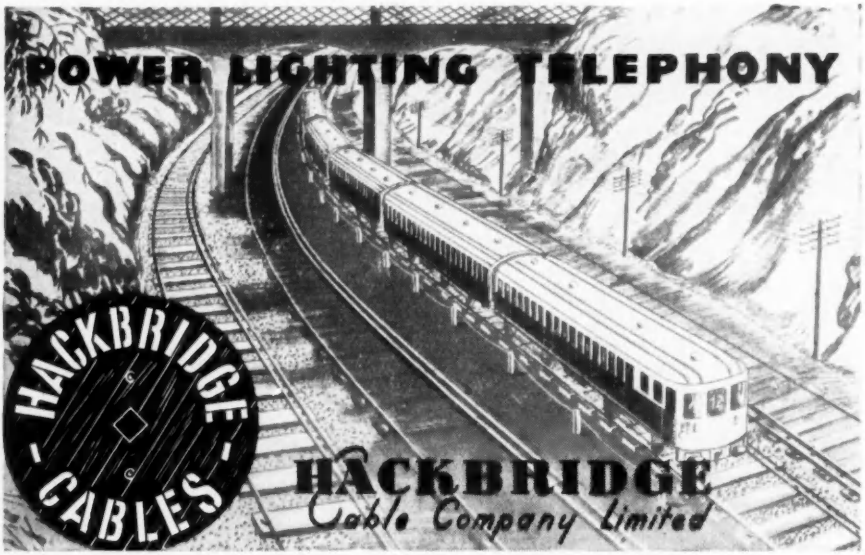

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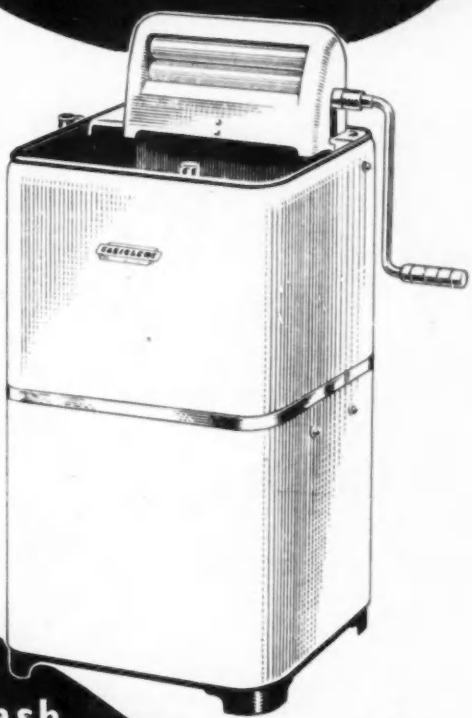
In association with BRYCE ELECTRIC CONSTRUCTION CO. LTD.
Branches at BIRMINGHAM, BRISTOL, CARDIFF, MANCHESTER, NEWCASTLE, SHEFFIELD.

Compact enough for the smallest kitchen...

The keen selling price of the new EASICLENE Electric Washer gives you a really big chance to bring in the customers; and price isn't all—deep cleaning action is kinder to materials, internally sprung wringer takes small or bulky articles without adjustment, and each wash can be loaded up to 4-4½ lbs. Send for full details.



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ELECTRIC WASHER

£28.10.0
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yet does a full family wash — cleaner — quicker!

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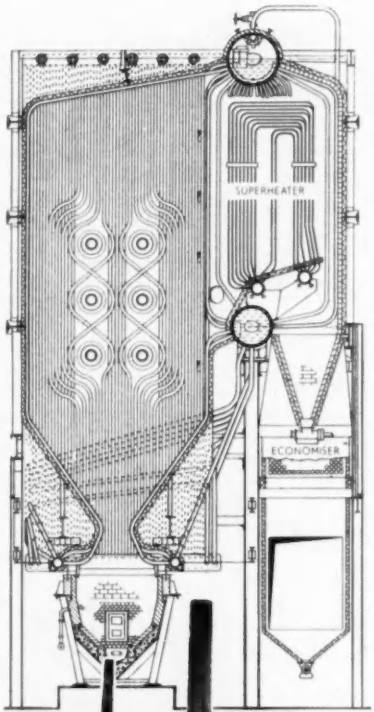
LONDON: KENT HOUSE, MARKET PLACE, OXFORD CIRCUS, W.1



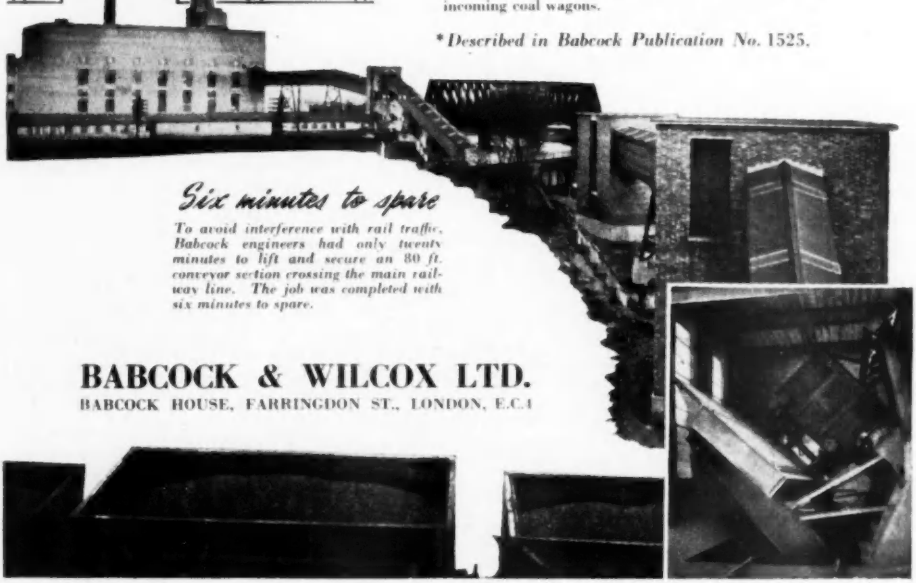
BABCOCK *at* *Peterborough*

THE boilers, the extensive coal handling plant and the "Hydrojet" and "Hydrovac" ash and dust disposal equipment of the new Peterborough power station, are all supplied by Babcock & Wilcox Ltd.

The p.f. fired boilers, each with an evaporation of 160,000 lbs./hr. at 425 lb./sq.in. and 825°F. are notable as the first units of the "FH" Integral Furnace type,* to be installed in a B.E.A. power station. This type of boiler has proved particularly suitable for medium capacity power stations and the larger industrial installations.

The coal handling plant, involves lengthy conveyor runs under and over the adjacent railway. Railborne coal is transferred by a 30 tons (gross) wagon-tippler to a belt, by which it is distributed to the storage area via a radial conveyor or passed on to the station via an 1,100 ft. 120 tons/hr. belt conveyor system, which includes magnetic separating, crushing and screening plant. The storage area is served by a 120 tons/hr. radial drag scraper; and a traverser is installed to facilitate the handling of incoming coal wagons.

**Described in Babcock Publication No. 1525.*



Six minutes to spare

To avoid interference with rail traffic, Babcock engineers had only twenty minutes to lift and secure an 80 ft. conveyor section crossing the main railway line. The job was completed with six minutes to spare.

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The new ATL **Terminal Block**

FOR CABLES UP TO 7/052

Moulded body and side shields, fitted with O.B.A. brass studs, brass links, and Ross-Courtney type terminals and nuts.

SUPPLIED AS SINGLE ONE WAY UNIT OR AS BUILT UP BLOCKS

PLASTIC COVER OPTIONAL

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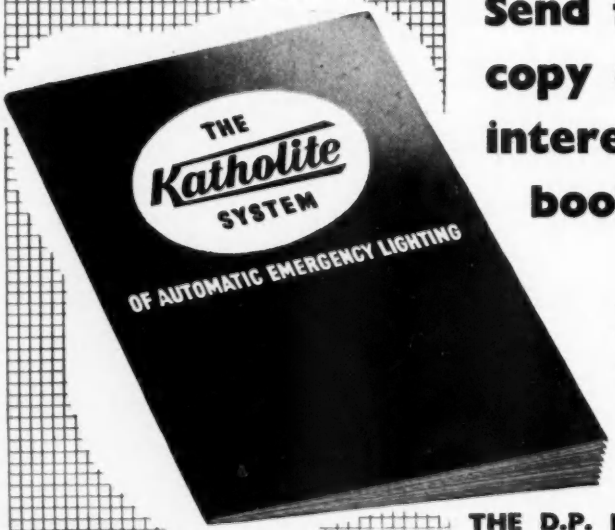

Send for a copy of this interesting booklet . .

The information and circuit diagrams embodied in this new publication should prove most useful to engineers and others who are interested in Emergency Lighting—please ask for publication No. D.P. 814.

THE D.P. BATTERY CO. LTD.

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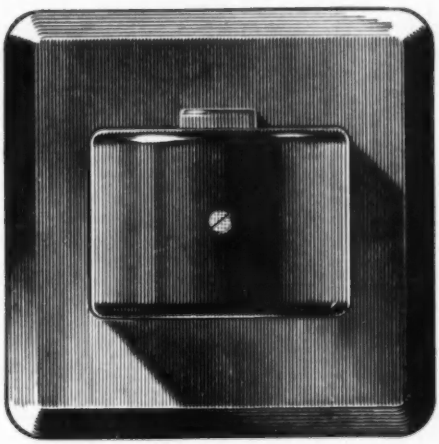

EDISWAN
CLIX

Surrey switches with their attractive appearance and quietly efficient, sliding bar switch action add a touch of distinction to electrical installations.

5 and 15 amp. switches, switch socket outlets, 30 amp. D.P. switches and cooker control units, all with the same unique switch style, enable you to maintain harmony of design throughout an installation.

Surrey switches have their own specially moulded switchplates and mounting blocks in place of the old-fashioned wooden blocks. They are quicker to wire and fix than ordinary switches and mount square and flush on the wall irrespective of errors in setting the box. As with all Clix products, Surrey switches are now marketed by Ediswan, thus providing a complete Ediswan electrical service.

Let us send you a sample switch with our catalogue and price list.
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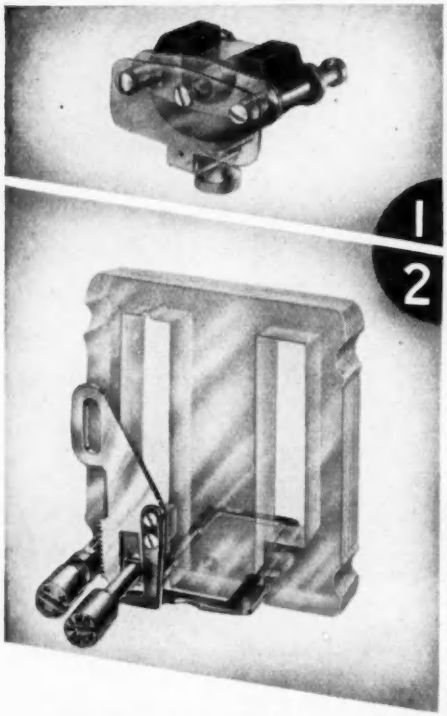

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1 MAIN LOAD
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3 LOW LOAD

Backlash has been eliminated on main load and low load adjustments and reduced to a minimum on the inductive load adjustment.

All adjustments have a large range, are smooth and positive in action and can be locked.

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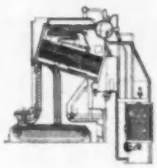
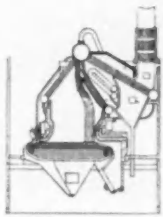
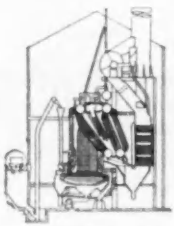
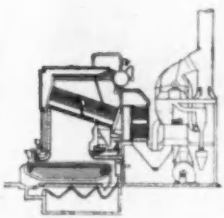


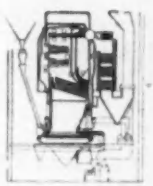


An 'L' Stoker for them all

For every known design and size of water-tube boiler there is a highly efficient 'L' type travelling grate stoker.







- *Close control of air supply*
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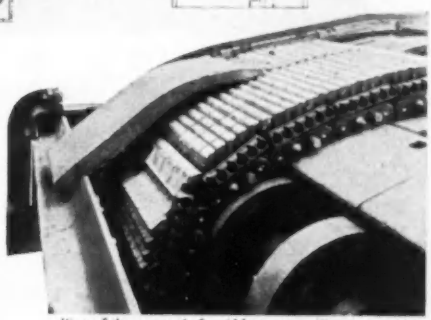

View of the rear end of an 'L' type travelling grate stoker

The result of Enterprising Engineering by ICL

INTERNATIONAL COMBUSTION LTD.

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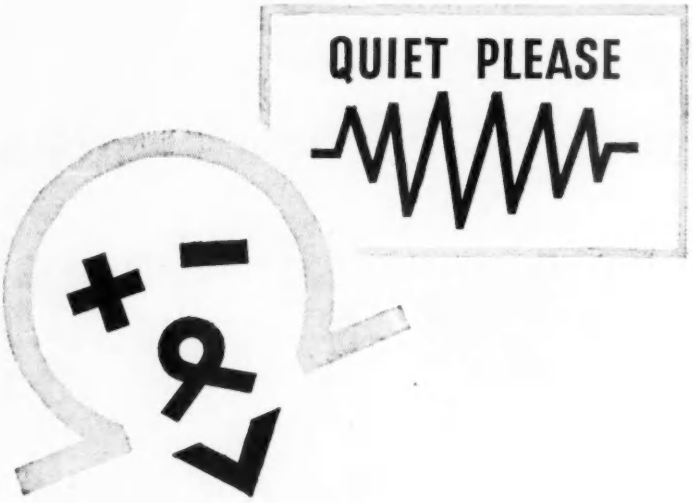

Complete electrical breakdown

IT really is too bad. Our friend should never have been subjected to such violent treatment. But it is his own fault entirely. He took on the job as insulator, claiming amongst other things, a fine, even temperament. Complete breakdown came with his first real test! He just couldn't stand up to it.

The point we wish to make is that insulating materials must be CONSTANT in the performance of their functions — and constancy is a characteristic very much in evidence in the range of DELARON Laminates.

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Birch

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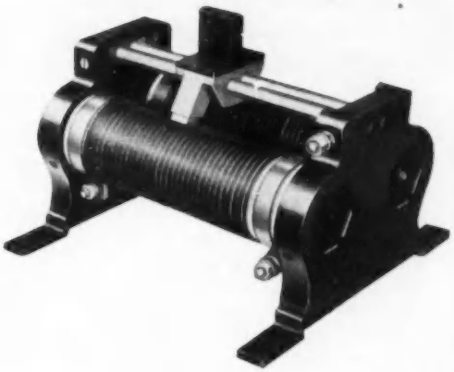

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Manufactured under Patent Nos. 551689 & 561690

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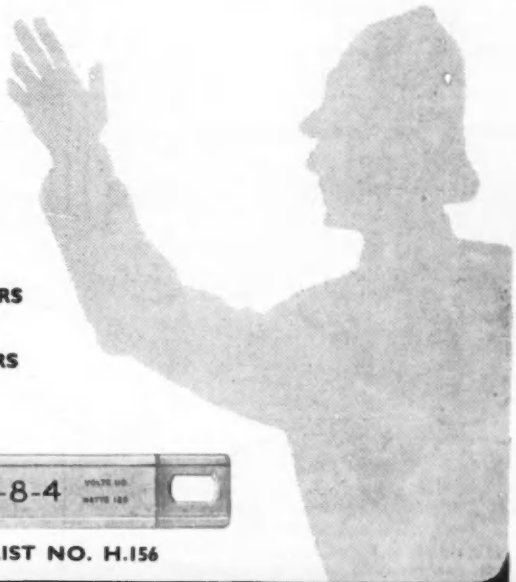

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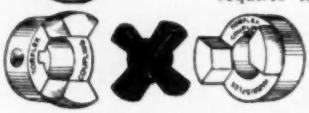
The 'HARRISFLEX' (TORFLEX) COUPLING

TYPE "K"

The type "K" Harrisflex (TORFLEX) coupling as illustrated has 5 special features. It is easy to fit, requires no lubrication, provides a cushioned drive, clock or anti-clockwise rotation and no noise.



It is simple in design, having only three working parts, two identical metal halves connected by a flexible spider-shaped element. A wide range of various types of couplings is available to meet most requirements.

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High-speed electric stacker with retractable towing device.

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ASBESTOS SYNTHETIC RESIN-BONDED BOARDS

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One of the "Siluminite" products is a laminated board, Grade "E.L.S.", made from resinated asbestos paper bonded under high temperature and pressure in sheets 40 in. square and thicknesses up to 3 in. This material has high mechanical strength, low water absorption and a wide field of application, including panels, terminal boards, etc., for medium voltage systems.

It is suitable for service at elevated temperatures up to 160 deg. C.

Colour: Brown, semi-gloss, but varnish or cellulose or stove-enamelled finishes are available.

Prompt deliveries can be made of sheets, or parts cut and fully machined to customers' drawings.

TURNERS ASBESTOS CEMENT CO LTD

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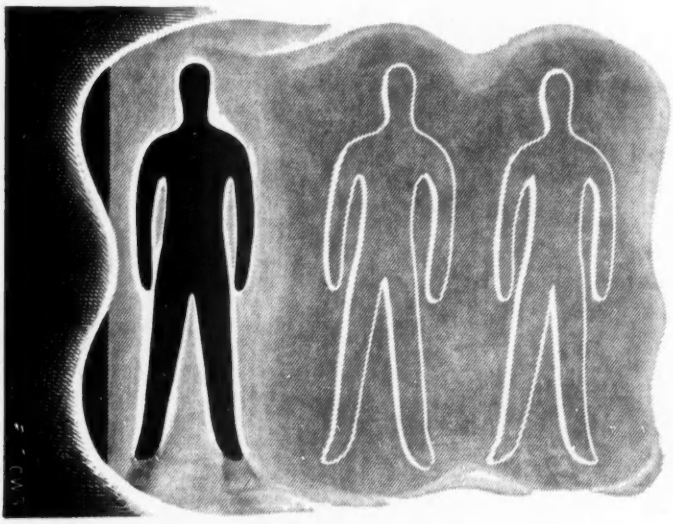
Two out of three...



...of the world's population live a life untouched by electrical power

CIVILISED LIFE, as we know it today, based on power applied to the machine, is little more than 150 years old. As yet, less than one third of the world's total population enjoy the full benefits of electricity — the modern source of power for industry.

To help satisfy this world hunger for industrial power, over 2,000 internal combustion engines ranging in power from 3 b.h.p. to nearly 3,000 b.h.p. are produced every week by THE BRUSH ABOE GROUP. During the past few years, the Group have placed this vast production to export markets. In 1952, the export output of the Group was approximately one third of the total United Kingdom exports of diesel engines and diesel generating sets.

The fact that 2 out of 3 of the world's population live a life untouched by electrical power, is a measure of the almost unlimited opportunities before this group of old established British engineering companies with a high reputation for the design and making of diesel engines and electrical generating and distribution equipment.

EXPORTING POWER THAT THE WORLD MAY BE FREE

THE **BRUSH ABOE** GROUP

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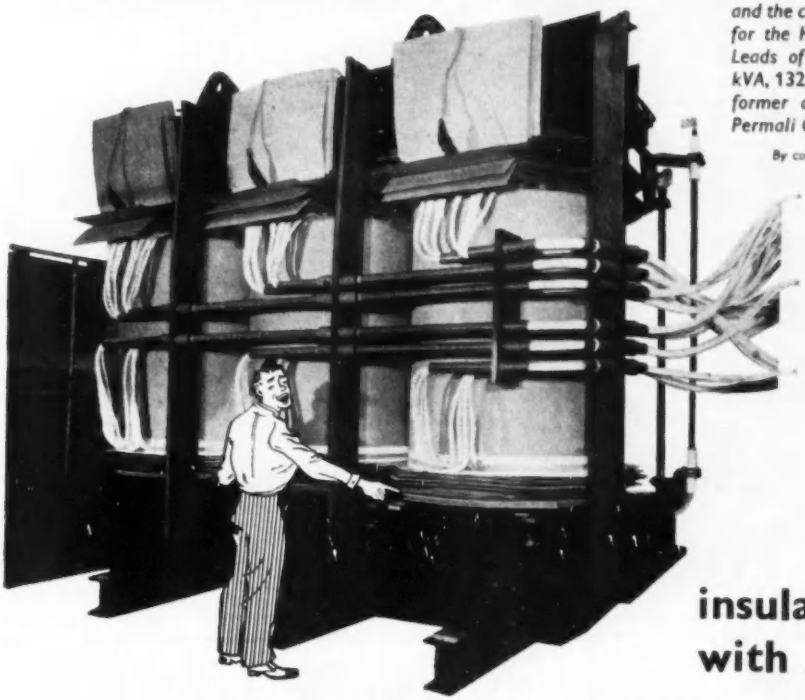

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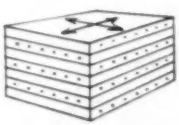

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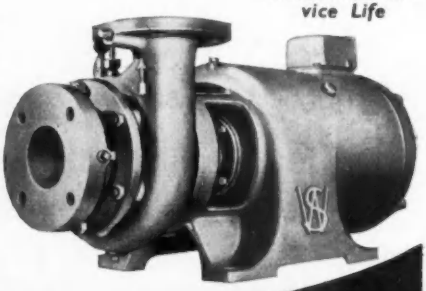

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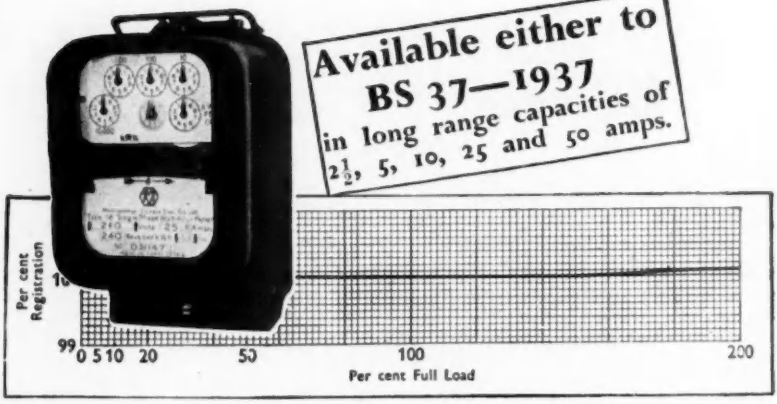
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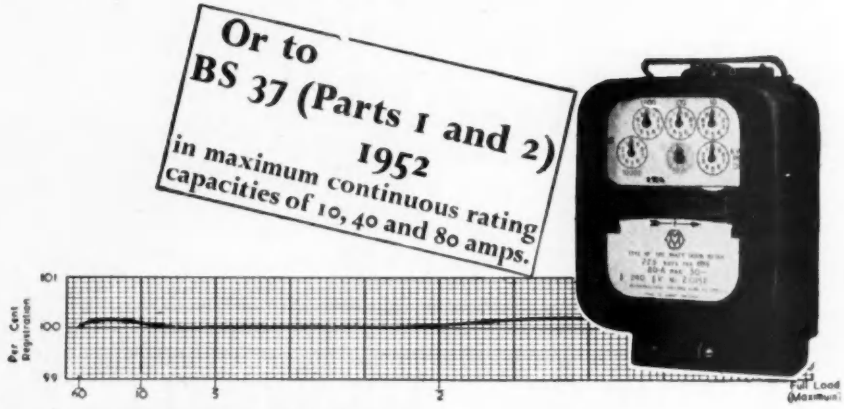

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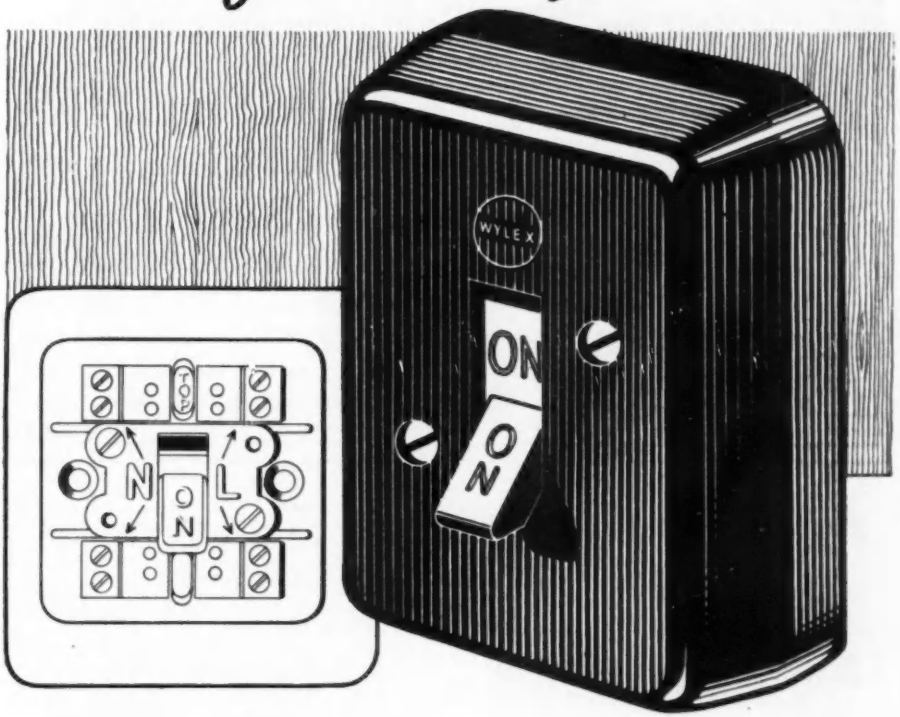

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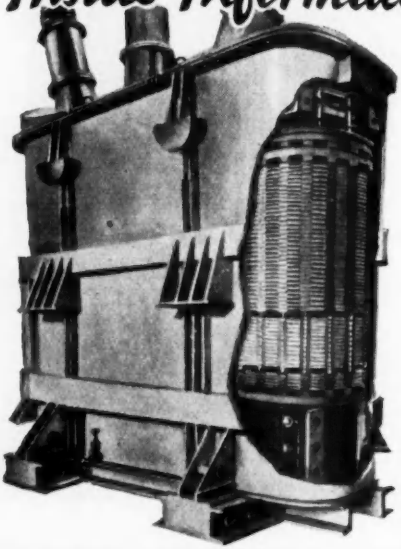

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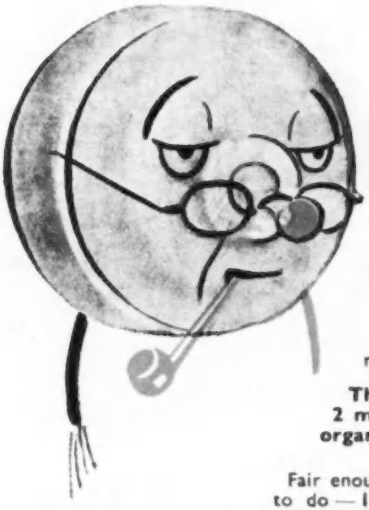

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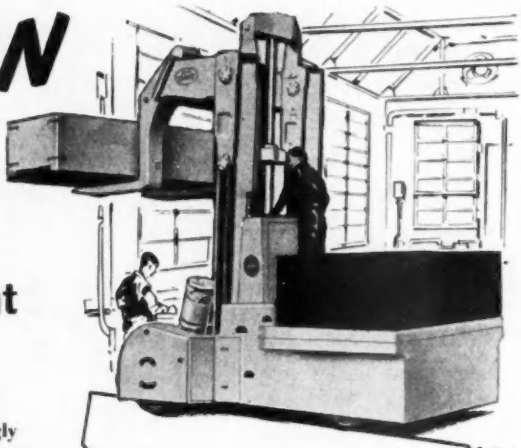

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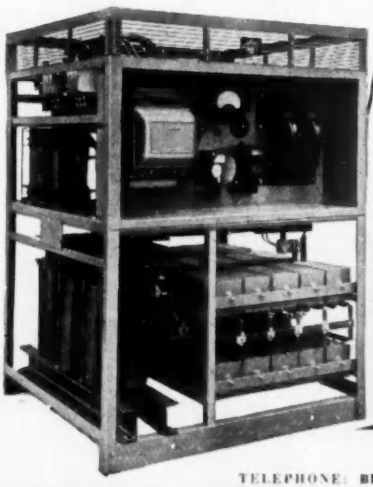

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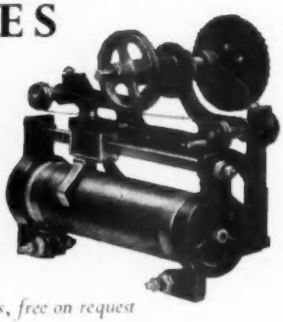

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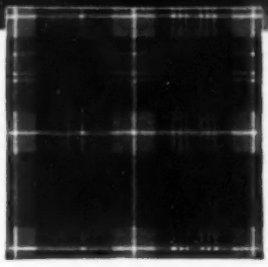

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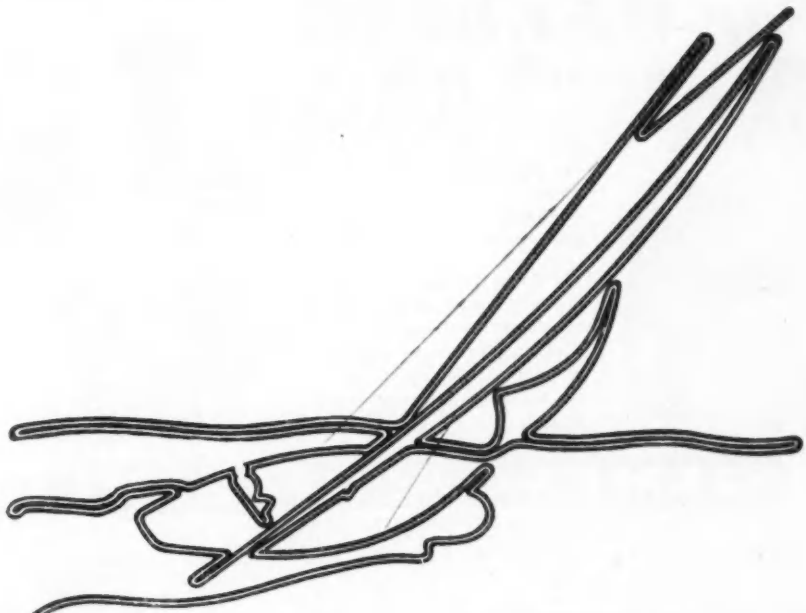

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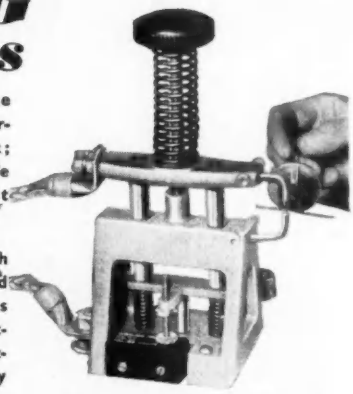

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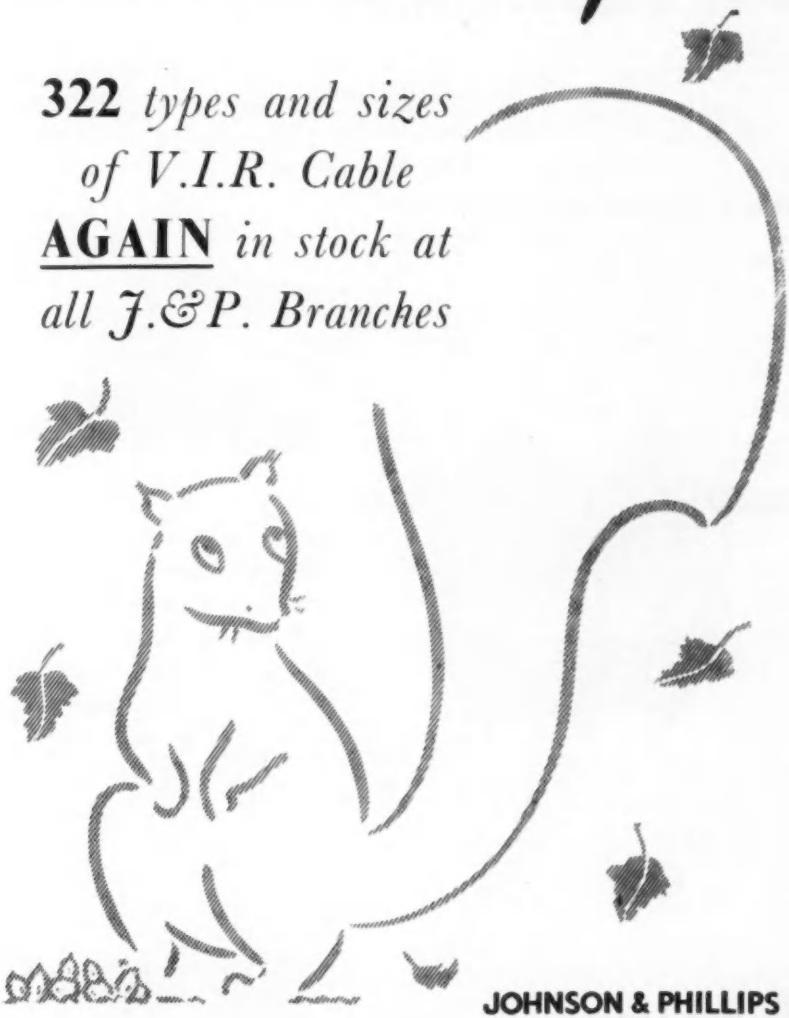

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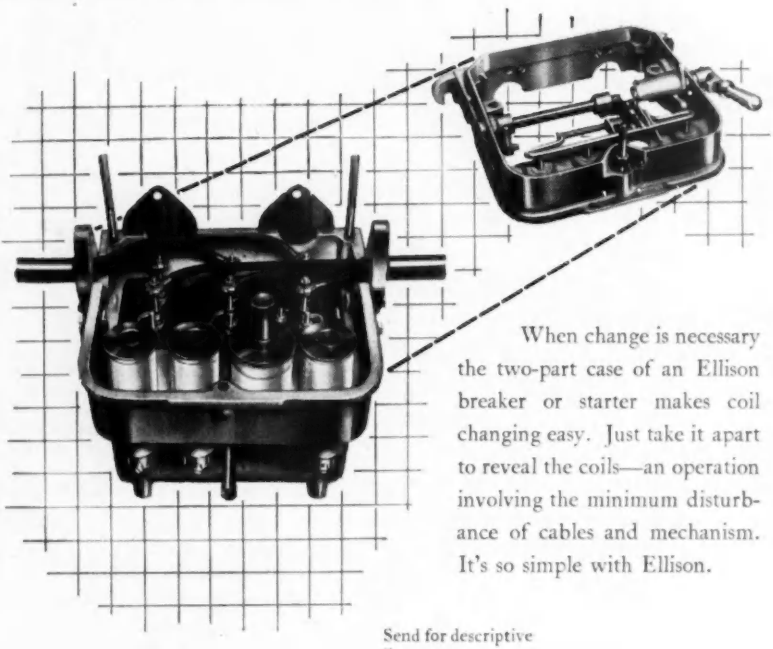

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ELECTRICAL TIMES

Volume 123 No. 3194 22 JANUARY, 1953

PUBLISHED EVERY THURSDAY

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Editorial

TOWARDS TWO TIERS

THE basic subject of organisational structure in the supply industry has been under continuous review for some time by a special committee of the B.E.A., and it is believed that a report of a special study on organisation was submitted some months ago. Area boards also have been studying their individual structure and the first major changes are now being made by two area boards in working towards a two-tier instead of a three-tier structure. The three-tier organisation was adopted by nearly all the boards after vesting day. It is not certain whence came this concept, but at that time a view was current in administration circles that the maximum number of channels of delegation from a single authority was of the order of seven or eight. This concept has in practice proved of limited application and there are many cases of effective control over considerably larger numbers of direct subordinates, particularly where these subordinates are exercising similar managerial functions. Within our own industry we have the example of the North of Scotland board where there are no less than fourteen districts or areas under direct control from headquarters. Thus there is adequate foundation for adopting a two-tier structure in electricity supply areas.

ENLARGING THE DISTRICTS

THE change from three tiers to two will, however, involve more fundamental changes than the straightforward disbandment of sub-areas. In most cases the number of districts will prove too numerous for adequate control from headquarters and some amalgamations will be necessary. This is what is taking place in the London Board where, in closing down the South Western sub-area next April, the five existing districts will be welded into two. The remainder of the change-over will take place gradually when retirement of staff or other causes provide an opportunity. Thus a saner basis of building will be achieved with far less disturbance to staff than occurred in the vesting day rush. It seems desirable, however, that two tier districts should bear a title which differentiates them from those subordinate to sub-areas. The other Board that is making similar changes in organisation has introduced the not-too-happy term "managed district," while the South East Scotland Board which has remained two tier throughout, utilises the name sub-area. The need for such nomenclature will be accentuated if other boards follow the present two examples, for no matter how great the swing to two tier, there will remain situations where physical conditions may dictate a preference for retaining the sub-areas. However, the change to a simpler structure has much to offer in the way of efficient administration, and it makes easier that much discussed but ever elusive decentralisation.

C.B. ADVANCE

A NEW edition of the principal British Standard on circuit-breakers must rank as a major event for the industry. There has been a fifteen-year gap since the last was published, and during that time continued activity has taken place in both design and research. The significance of this work is shown most strikingly by the new top a.c. rating of 7,500 MVA at 275 kV, compared with the maximum of 2,500 MVA at 220 kV, recognised in the 1937 specification. But apart from such large-scale changes, there are some interesting modifications of detail. Thus impulse voltage testing, a practice common for most high voltage equipment is now a requirement for circuit-breakers. Of particular interest is the attention now given to the method of

earthing the system in which the circuit-breaker is to be connected. Experience with arc-suppression coils, and with operation with sustained phase-to-earth faults in systems so connected, has led to some differentiation in the voltage-test requirements of circuit-breakers according to their intended application. Even with these changes, however, the standard is recognised as being in some ways an interim specification only; research now proceeding will enable further clauses to be written-in when it reaches finality, notably with reference to the effect of rate of rise of restriking voltage as a system parameter.

E.D.A.'s MINORITY

IT is no secret that E.D.A.'s conservative policy on promotional activities has been determined by the B.E.A. and area boards which largely make up its Council, and this policy is derived in turn from the dictates of the Ministry of Fuel. But there is also present a minority interest and the Chairman of the Electricity Board of Northern Ireland has recently been complaining bitterly of the absence of promotional activities by E.D.A. to which his Board contributes. Northern Ireland like Great Britain is experiencing a slowing down of load growth, while sales of appliances have actually fallen and this may in part be due to the lack of promotional advertising. However, with nearly nine tenths of E.D.A.'s revenue obtained from the B.E.A. and area boards, Sir William Robinson has little chance of redress, for although the law is careful to protect minority holdings in controlled companies, no parallel exists in voluntary associations. The only hope lies in the easing of the ministerial restrictions on promotional advertising which we all hope to see in the near future.

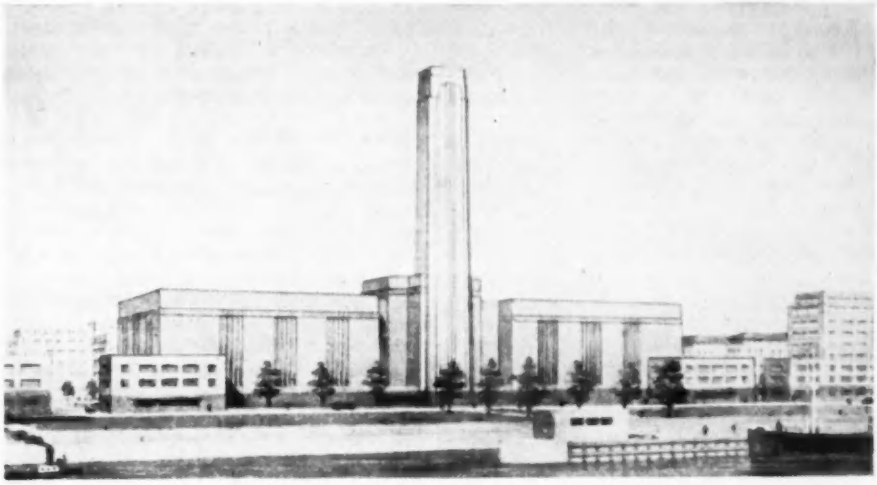
RESEARCH FOR PRODUCTION

SUGGESTIONS that in this country fundamental research and associated subsequent development too often fail to bring their deserved rewards because of poor production techniques, have been common of late, but there is some noteworthy contrary evidence this week. A review presented as an I.E.E. paper shows that electronics engineers, always progressive and lively, have been investigating the technique of printing circuit connections, and perhaps resistances as well, and then of enclosing wiring and all other components in suitable plastic materials to give shock, moisture and vibration-proof bricks. Such methods lend themselves well to the mechanisation of production, with the control of quality that is then possible, provided that the quantity demanded is high enough: but they have only been achieved by constant research and development aimed specifically at developing a new production method. The brick technique is well suited to the expanding needs of industrial electronics, where the practicability of simple servicing may decide for or against acceptance. Further, there is the visionary possibility, which we described recently, of the use of printed coils even for such power engineering components as windings of transformers and small motors. The whole story is one which illustrates that research devoted specifically to production techniques can pay.

BATHOS IN PLANNING

WHEN the new Bankside station was no more than a project not yet on the drawing board, it was subjected to the bitterest of opposition. Such a building of substantial size and utilitarian purpose should not be allowed to vie with the mighty St. Paul's itself. Today the first half of the station is complete. Here is to be seen the tender care of architectural design, the grandeur of the broad viewpoint, the minute attention to detail. Surely, never, on such a costly site, have space considerations been so freely ignored; there has certainly been no skimping which might interfere with the architectural beauty of a building which was to form part of a grand new scheme of South Bank development. Today this building stands surrounded by corrugated iron sheds, garbage wharves and refuse barge moorings. All this in the sacred name of planning!

Meteor



A Station Worthy of London!

BANKSIDE "B" GOES ON LOAD

BANKSIDE, the stretch of river bank opposite St. Paul's Cathedral, has had a long, and sometimes none-too-savoury, history. To the Londoner who knew his London, however, the river road from just east of Blackfriars Bridge to the railway bridge from Cannon Street was a most pleasant walk, and much disappointment was felt when this road was closed during the building of Bankside B power station.

The proposal to build this station, located adjacent to the original Bankside station, and ultimately designed to spread over much of the original site, was the cause of much criticism, mostly from idealistic and ill-informed sources, which whipped up sufficient public opposition to result in a public inquiry. Further, the establishment of an "industrial" building within an area scheduled for development with offices, light industries and buildings for cultural purposes, required special consent, and with that a large amount of control over the design passed from the electrical industry into the hands of outside interested parties.

However, consent was obtained, a satisfactory design—by Sir Giles Gilbert Scott—was approved, and subject to the conditions that the station should be oil fired and gas washing plant installed, building began some short time after the end of the war.

The station is being built in two halves, and the first of these, which does not interfere with the running and operation of the old station, is expected to be completed this year. When finished the main building will lie parallel to the river bank, but set back a sufficient distance to allow for a road and gardens to be laid out between the site and the river bank.

Ultimate capacity of the station will be 240 MW in four 60 MW units, steam being supplied from eight 375 klb/hr boilers. In the first half, containing two 60 MW machines and four boilers, one of the sets with its two boilers is on load, and the other set and the remainder of the boilers are in process of erection.

The main building will be approximately 525 ft long by 240 ft wide, and is of steel frame construction, clad with brick walls, and it possesses a reinforced concrete roof having glass lantern lights. An unusual feature is that the turbine house roof and switch house roof have been carried up to the same level as the boiler house roof—some 90 ft above ground level. The central chimney, about which much of the controversy raged, is of rectangular section and rises to 300 ft above ground level.

Considerable civil engineering work was required in connection with the establishment of secure foundations, the subsoil being typical of

The Architect's drawing of the project is shown above

many London sites and consisting of 10-15 ft of made ground and soft clay at the surface, 20-30 ft of water bearing ballast, and finally London blue clay. For heavy loads the clay provides the only reliable bearing medium, and, consequently, all the main foundations have been carried down to this stratum, mostly in sheet-steel-piled and timbered trenches. The ground water level in the ballast is about 3 ft below datum.

From north to south, that is from the river side inland, the main building comprises the boiler house, turbine house and switch house, all of which have a basement level of 9·5 ft, n.d., with the ground floor at 18·5 n.d. On the south side of the switch house are located the transformers and still farther south beneath an open grass covered area is the oil storage.

Mass concrete construction was used for the basement retaining wall, which was constructed in a sheet-steel-piled trench. For the main stanchion and boiler foundations, mass concrete strips were used, laid in the clay, and the turbo-alternators are carried on mass concrete piers, founded on clay and built up above the basement floor level in reinforced concrete. The chimney is carried on a cellular foundation which rests on the clay at 30 ft below datum.

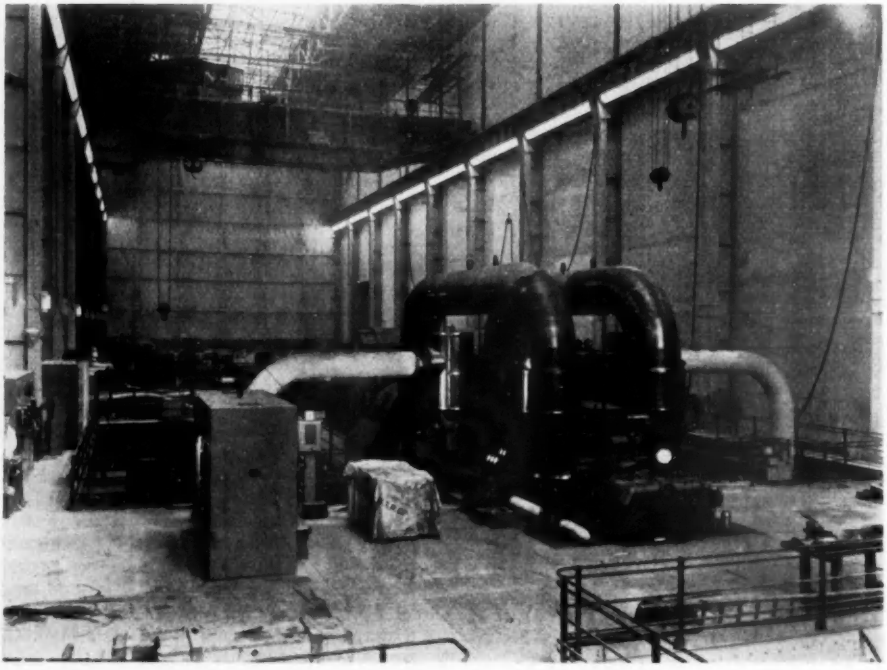
Transverse dimensions of the building sections are : boiler house 103 ft; turbine house 76 ft and switch house 61 ft.

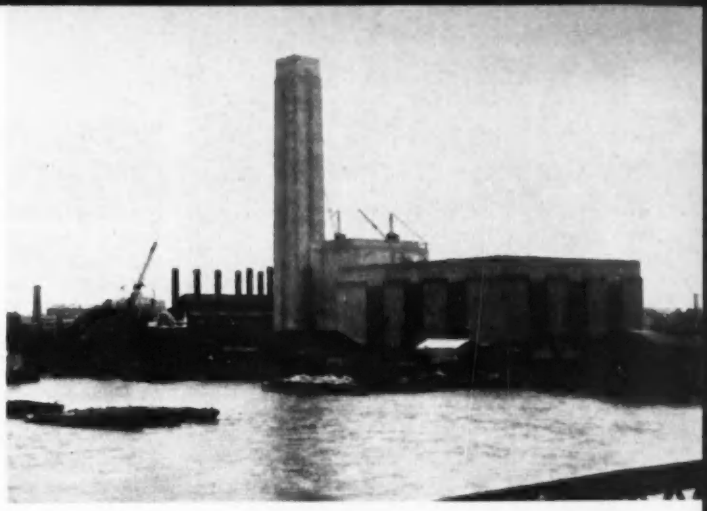
Fuel Handling

Fuel is brought to the station by fuel oil tankers and barges, and is off-loaded at an island jetty some 293 ft long built out into the river. Off-loading can take place both on the outer and inner sides of the jetty and up to four vessels may be accommodated simultaneously. A vertical shaft, 18 ft in diameter, on the jetty connects to a 9 ft 8 in. diameter horizontal shaft which runs under the intervening river channel to the oil storage area. An intermediate vertical shaft connects this tunnel with the boiler house. Through these tunnels run the oil fuel pipes. A lift is provided at each of the three shafts.

As was mentioned before, the oil storage area is south of the main station and is underground. It is surrounded by a retaining wall of circular arch and buttress construction and comprises three tanks. These are filled by pipes

A view of No. 1 60MW turbo alternator from the steam end





General view of station and jetty looking south east

running from the jetty and each tank, 92 ft in diameter and 24 ft high, has a capacity of 4,000 tons. A further three tanks may be installed for the second half of the station.

The oil is pumped through from the barges either by the pumps installed on the 500-ton tankers, or alternately, by pumps in a special pump house on the jetty if towed barges are used. As the oil comes from Shell Haven, a few hours' haul up the river, the oil temperature is high enough on arrival to pump without requiring special heating on towed barges.

Within the tanks, however, steam heating coils have been installed, and all pipe lines are traced with one or two 1 in. diameter steam lines, and all boilerhouse and jetty pumps together with filters are steam jacketed to keep the fuel at a temperature of not less than 110° F.

Boiler Plant

From the storage tanks, oil is taken by three motor-driven circulating pumps, each with a capacity of 44 tons/hr at 40 lb/sq. in. and these feed a 10 in./8 in. ring main to the boiler house and bank. With normal levels a gravity feed to the boiler house, however, can be used.

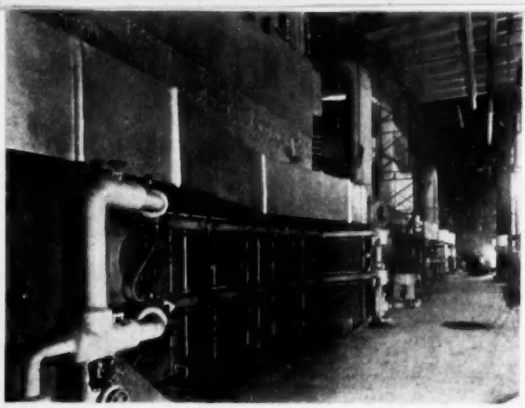
At the boilers, built by Foster Wheeler, the pressure is stepped up to between 250 and 300 lb/sq in., by oil pumps driven by variable speed d.c. motors. Power for these motors is supplied by grid-controlled mercury arc rectifiers which, in turn, are controlled from the boiler control board. This affords a primary control system for varying boiler loads.

From the h.p. pumps the oil passes to two transverse mains, running across the boiler face, and feeds are taken off to the 12 oil burners which are arranged horizontally in two rows of six. Each burner is of the atomising type and is fitted with gas pilot burners for ignition purposes. The h.p. pumps and heating units are arranged below the boilers, as the oil is raised to a temperature of 250° F. for burning. The multiple burner system is also used for boiler output control as the number of working burners can be varied.

The steam generator itself largely follows normal practice, being of the single-drum water tube type with natural-circulation and water-cooled combustion chambers. Primary and secondary horizontal drainable convection type superheaters are incorporated together with a plain steel tube economiser and primary and secondary air heaters. The secondary air heater is of the plain steel tubular type and the primary, which handles cooler gases, uses gilled cast-iron tubes to resist corrosion. A boiler convection bank is included between the primary superheater and the economiser. Wide pitching has been used for the superheater and convection heating surfaces to allow slag accumulations to fall clear when removed from the tubes.

Adequate provision has been made for water washing the primary and secondary superheaters, the boiler convection surface, economiser and the primary air heaters, which are arranged in separate compartments with individual hoppers for the collection and removal of effluent. Soot blowing is carried out by electrically-operated steam blowers, automatically controlled in sequence from a panel at operating floor level. For draught control, two two-speed vane-control forced draught and two two-speed induced draught fans are provided for each boiler.

Maximum continuous rating figures for each boiler are 375 klb/hr at 950 lb/sq. in. 925° F. with a feed temperature, after the economiser of 370° F. At this rating the thermal efficiency (gross) is 85·9% and the oil consumption (calorific value 18,250 B.Th.U./lb.) is 26,800 lb/hr. With normal economic rating, the output falls to 300 klb/hr, at the same pressure and temperature, the efficiency rises to 86·5% and the consumption drops to 21,300 lbs/hr of oil. It should be noted that although two boilers are provided for each set, it is possible to run the two sets fully loaded on only three boilers thus permitting easy maintenance.



A view of the boiler face to show the oil nozzles and feed pipe arrangement

The generating plant, arranged in line along the station, will consist of four 60 MW sets. Those in the first half of the station are of B.T.H. manufacture and are of the two-cylinder type with double-flow low pressure cylinders. The steam enters between the h.p. and l.p. cylinders, flows outward through the h.p. unit and is then transferred by overhead pipes to the centre of the l.p. unit. The design figures are for 900 lb/sq. in., 900° F. with a continuous maximum economic rating of 60 MW at 0·875 p.f. Vacuum is taken as 29 in. Hg with a barometer reading of 30 in. The turbine bleeds off steam for 5-stage feed heating, and the consumption figure is estimated at 8·5032 lb kWh. Lubricating oil is supplied by Shell.

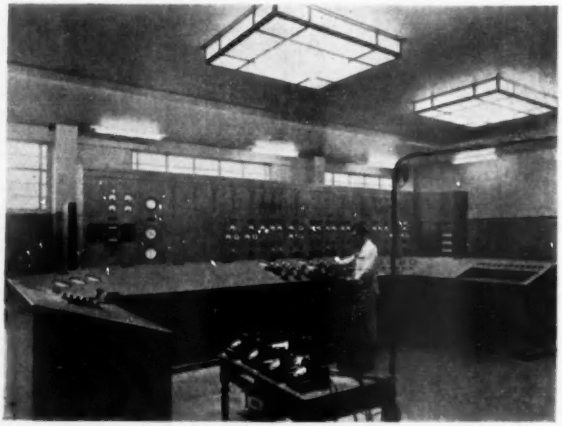
Air cooling has been adopted for the alternators, the fans being included in the foundation blocks. Unlike the practice adopted in many modern installations for 3,000 r.p.m. machines, the exciters are direct driven off the alternator shaft. Generated voltage is 15 kV.

Condensing and Feed Heating

Each turbine exhausts into a twin condenser with a total cooling surface of 50,000 sq. ft. and taking 40,000 gallons of circulating water per minute in two passes. Air removal is carried out by two 100% capacity 3-stage steam-operated air ejectors. The condensing and feed heating plant, manufactured by Richardsons, Westgarth and Co. Ltd., operates on a closed-feed system in which the necessary flexibility between the condensation quantity from the set and the feed demand from the boilers is provided by a control valve actuated by the water level in the condensate receiver below the main condensers. The condensate is discharged from the receiver, by motor-driven extraction pumps, through the air ejector, drain cooler, gland heater and l.p. feed heaters in turn, and then proceeds to a spray type de-aerator situated in the basement. Pumps extract the water from the de-aerator and discharge it to the boiler feed pumps which in turn force the feed through three h.p. feed heating stages, in series, to the feed mains.

Arrangements have been made to permit fully de-aerated water to be used for topping up banked boilers even when the main sets and feed heating plants have been shut down. Heating coils have been provided in the de-aerator tank and small pumps are provided for re-circulation and discharging boiler feed.

A permanent test station, with a calibrated test venture, and indicating, recording and integrating instruments has been provided to permit the taking of turbine steam consumption tests. This station is connected to the system in such a manner that the total feed flow from either machine (in the first half) can be diverted at will through it. Double valve shut off is provided on all common mains and services to the two machines so that one set may be quickly and easily isolated when accurate test data are needed.



The control room with an engineer operating a portable plug-in synchronising panel

Feed Pumps and C.W.

A common feed pump suction and delivery main is provided and three 100% motor-driven and one 100 % steam-driven feed pumps are provided for the two turbo alternators. The pumps operate at 3,000 r.p.m. and can generate a pressure of 1,250 lb/sq. in. when delivering 600 klb/hr of water at a temperature

of 246° F. Automatic thermally operated leak-off valves are provided as a safeguard at times of low flow. When the feed range pressure drops below a certain point, the turbine-driven pump automatically cuts in.

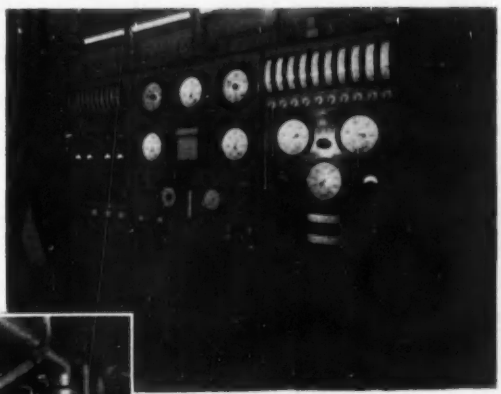
Circulating water is taken from the Thames, the intake shaft, 18 ft in diameter being located at the west (or upstream) end of the fuel jetty. This leads down to a 10 ft diameter cast iron tunnel, concrete lined, which has been driven through the clay. The penstock chamber is incorporated in the chimney foundations and from the chamber the water goes to a reinforced concrete suction chamber in the basement. Water is drawn from this suction pit by the C.W. pumps of which there are four, each being a centrifugal type pump driven by a motor through a vertical spindle. The capacity of each of these units is about 1,640,000 gallons/hr and the four of them are capable of supplying the first two machines. Each pump discharges through a rotary water strainer to 42 in. and 60 in. diameter cast-iron pipes to the condensers. After passing through the condenser tubes, the water is conveyed to a discharge culvert which has been constructed beneath the basement floor in reinforced concrete, lined with asphalt. This flows westward to an 18 ft diameter discharge shaft where the discharge penstock is fixed. A 10 ft diameter concrete-lined cast-iron tunnel carries the water to the north side of the river, close to Blackfriars Bridge, where a further 18 ft diameter vertical shaft leads up to river bed level. The under-river tunnel, driven in clay, is about 60 ft below ground level.

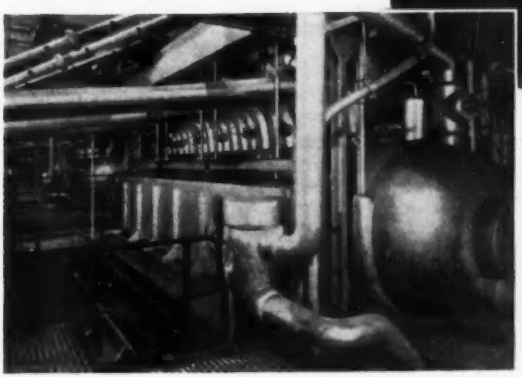
Transformers and Switchgear

Each generator is connected to a 66 MVA, 3-phase delta-star transformer which steps up the voltage from 15 kV to 66 kV. Each of these transformers contains in the same tank, a 5 MVA 3-phase, delta-interstar unit transformer with a voltage ratio of 15/3 kV. These latter units, together with two 7 MVA 3-phase delta-star house service transformers stepping down from 66 to 3 kV, supply the station auxiliaries.

As the station is located well at the load centre, it supplies the London Electricity Boards h.t. distribution network through four 25 MVA 3-phase delta-star transformers, stepping down from 66 kV to 22 kV, and four 15 MVA star-star transformers stepping down from 66 kV to 11 kV. All these transformers are housed in open-fronted cubicles on the ground floor of the switch house. In addition to the large units, there are seven 500 kVA 3-phase delta-star units, voltage ratio 3 kV/415 volts for supplying power to auxiliaries, and, to reduce potential fault currents, a set of three single-phase, oil-immersed busbar sectionalising reactors has been installed in a cell adjacent to the transformer.

The mains 66 kV switchgear, rated at 2,500 MVA and made by Metropolitan-Vickers Electrical Co. Ltd., is situated on the three upper floors of the switch house; the circuit breakers





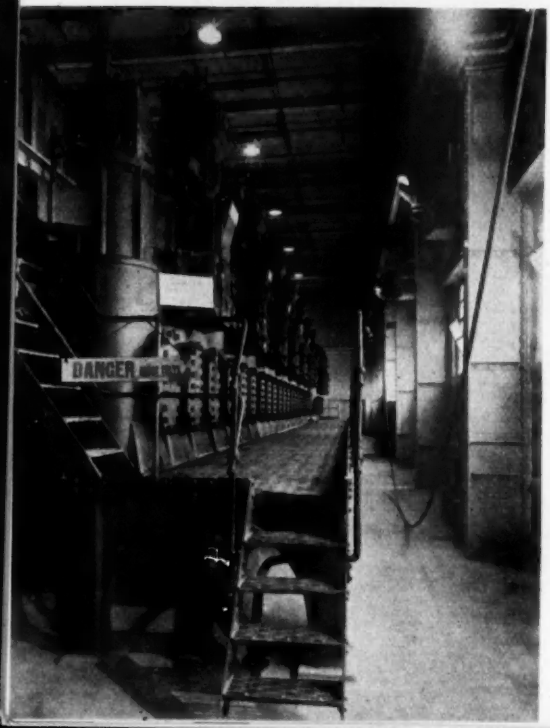
Above can be seen one of the boiler control panels. Fuel regulation is carried out on the right-hand panel which carries meters showing oil pressure and fuel motor current. On the left is a view of the boiler top showing the main drum

themselves are located on the upper floor, the selector switches for busbar selection immediately below and the busbars themselves on the lower floor. All busbars and connections are of the condenser-bushing type with all joints and tee-connections contained in oil-filled sealing chambers. The control room is also located on the upper floor, and contains the instrument and operating panels for the 66 kV, 22 kV, 11 kV and 3 kV switchgear. In the centre of the room is a generator control desk and from it can be seen all the control panels. Here an unusual feature is the use of plug-in synchronising trolleys which give running and incoming volts and contain a synchroscope. These units can be plugged in where needed by means of a flexible lead.

Secondary Switchgear

On the ground floor of the switch house are located the 22 kV 500 MVA duplicate-busbar two section switchboard, and the 11 kV 350 MVA duplicate-busbar two section switchboard. The 3 kV 150 MVA units for controlling the station auxiliaries are located with a main switchboard in the switch house unit boards, associated with each generator in the mechanical annexe. As far as the 415 switchgear is concerned, the main and sub-distribution boards are situated in various parts of the building close to the auxiliary-transformers associated with them.

Here is a view of the main 66 kV switchgear which is located in the upper storey of the switch house



Several earthing systems are adopted at the station. The generators for example are earthed through voltage transformers, the neutrals of the 66 and 22 kV systems are earthed through limiting resistors, while the 11 kV, 3 kV and 400 volt systems are solidly earthed. Outgoing from the station are two 66 kV cables to Battersea, two 66 kV cables to Deptford and ten 22 kV cables and twelve 11 kV cables to various substations of the London Electricity Board.

General Plant

The main steam, feed and drain pipework has been butt-welded throughout and all valves are similarly welded in. In order to conserve make-up water, a complete recovery system has been installed for all high-pressure and low-pressure clean drains, blowdown receivers discharging the drains into conservator tanks for pumping back into the system. All dirty drains are discharged from receivers to drain sumps where compressed-air-operated ejectors transfer the dirty water to sewers.

Three auxiliary river pumps are installed which discharge to high level tanks in the boiler house, and from these tanks is taken water for cooling and sealing requirements.

To provide the compressed air for general station services, two 500 cu. ft/min. air compressors have been installed.

Fire protection is provided by a Mulsifyre automatic fire extinguishing plant which covers all the important electrical equipment as well as the fuel oil and turbine lubricating oil systems. Carbon dioxide equipment is also installed together with hydrants and portable hand appliances where thought necessary.

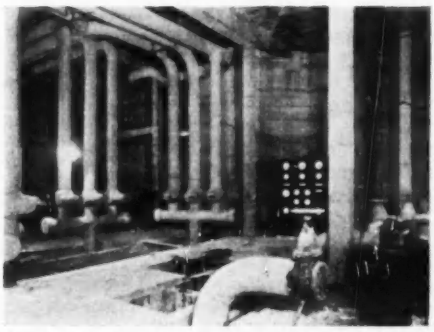
Two travelling cranes have been installed in the turbine house, the maximum lift being 150 tons, and auxiliary hoists have been provided for handling such items as the feed pumps, circulating water pumps and strainer handling.

At the west end of the main buildings there is an annexe which provides accommodation for offices, workshops, stores and changing rooms. This structure is of *in situ* reinforced concrete framing with brick walls and reinforced concrete roofs and floors.

Flue Gas Washing

As one of the main objections to the erection of the station was the presence of sulphur oxides in the flue gases—an objection incidentally which was raised in almost identical manner when Battersea was put up—an

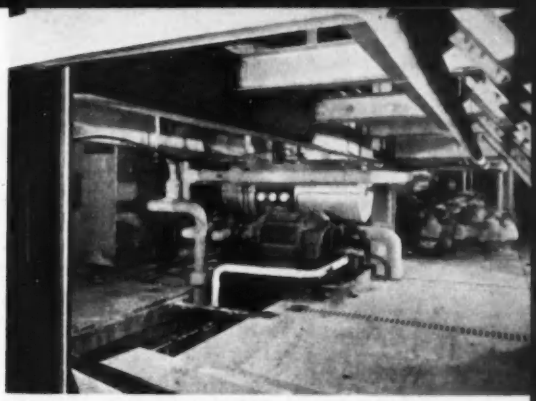
effluent type flue gas treatment plant has been installed to deal with the gases. This plant is designed to remove 95% of the sulphur oxides contained in the flue gases when oil with a maximum sulphur content of 4% is being burned. Two gas washing chambers, one for each half station, will be situated in the centre of the building between the two groups of four boilers. The chambers, of cast-iron plate, will each be 106 ft high, 53 ft wide by 48 ft deep, and each chamber will contain two absorption passes, through which the gases pass in series, together with a transfer pass. The contents of these chambers consist of timber scrubbers of "egg-box" construction which pack each chamber to a depth of 55 ft. After leaving the scrubbers, the gases are discharged at the top



The l.p. fuel pumping chamber and tank manifolds

to a cast-iron plenum chamber, and leave this by four cast-iron octagonal flues for discharge up the chimney. Each flue is fitted with a damper and each has a nozzle at the top so that at any station load above 25% the gases may be discharged at a velocity of between 60 and 120 ft/sec.

Wash water is pumped to the tanks through a 30 in. bore pipe, by eight pumps (five initially installed) connected to the condenser circulating water discharge culvert. Each pump handles 220,000 galls/hr against a total head of 175 ft. Chalk, required for the absorption process, is injected in the form of a 50% slurry into the wash water by means of pumps situated below the terrace. On leaving the chambers, the wash water is acidic in nature and is therefore passed through rubber-lined pipes to 45 ft deep aeration chambers where air from a battery of compressers is released from ceramic diffusers to pass through the effluent. After further purification by oil separators, the effluent joins the c.w. discharge for return to the river.



Heating and h.p. fuel pumping equipment below the boilers

Miscellaneous

We were recently permitted by the B.E.A. to inspect progress at this station, and the first impression gained is the remarkable spaciousness of the interior. The making of the boiler and turbine houses into what is virtually one unit with no intervening walls and a common roof level leaves a remarkable amount of headroom above the turbo-alternator and crane and between the crane and the roof. The width too, seems to be somewhat greater than might have been expected.

Points of particular interest are, of course, mainly centred around the oil handling and storage equipment and the gas washing plant. In connection with the former it was interesting to see that a completely independent steam-raising plant has been installed to keep the oil warm for pumping purposes. It is to be hoped that the fuel used in this plant will be taken into account when the overall thermal efficiency figures of the station are published! Of the switchgear, there is little to be said. If anything, one can say that it is of well tried and proven types. Again of the building and the architecture, there is little to comment upon, so much has already been said elsewhere. It is probably unique, and certainly must have been remarkably expensive, but as pointed out at the beginning of this article, the design was largely dictated by outside influence entirely unconnected with the generation of electricity.

Probably the most unusual features are, of course, the chimney which, as Sir Giles Gilbert Scott emphasised in the preliminary inquiries, was designed to look more like a campanile than a chimney, and the building height which, as far as the boiler house is concerned, is much less than would be required for steam boilers of equivalent capacity.

Our thanks are due to Mr. H. V. Pugh, Controller, London Division for permission to view the station, and for the technical data.

Packaged Wiring for Electronics

Printed and Potted Circuits increase production of small equipment

WITH electronic gear coming into increasing use in factories, although maintenance considerations and high first cost limit its range of applications, any advance in electronic circuit assembly techniques is taking on a special interest for the power frequency engineer. Thus a paper* presented last week at the I.E.E. may be a sign of things to come, even though its concern is at present mainly with radar and telemetering equipment for the Services.

One of the cheapening processes described in this paper is the printing of circuits, including wiring and resistance. It is stated that there are today four methods of depositing wiring in use in Britain, always, of course, in instances in which many repetitions are required. The particular advantage of the two-dimensional circuits produced is that they lend themselves most readily to automatic assembly methods.

In one promising technique, a metal block with a raised pattern is used, rather like a printer's line-block. After silver powder has been spread evenly over the surface of a laminated plastic panel, this block, which has been heated, is pressed firmly down on it. The compressed silver is bonded to the panel, while the remainder can be brushed off and used again. For greater flexibility strips of steel may be formed into the desired wiring pattern, and held in a magnetic block to form the die. With this method of formation on a phenolic-resin plastic base, lines 0·003 in. thick and $\frac{1}{32}$ in. wide can carry up to 12 amps before the base material blisters.

Holes can be punched through the panel to enable components to be connected with the printed wiring, through right-angle leads. The base of the plate is dipped in a solder bath, and the component wire-ends cropped-off.

Another process now being used in digital computor construction uses a glass base, pierced with holes. A silver paste is used to coat the inside of the holes, and the circuit design is then screen printed with a similar paste, using both sides of the glass. A contact strip (later used for plugging-in the plate) is printed along one edge. The plate is then fired at a high temperature and annealed, resulting in connections having a resistance of 0·1 ohm or less.

Resistors for this particular method are based on a 10 mm x 7·5 mm strip, as the power dissipation is low. Sprayed carbon-resistance films are used, and then automatically controlled zig-zag engraving resorted to in order to obtain values from 1 to 68 kΩ. Ceramic capacitors are available in the same dimensions, to give values up to 0·01 microfarad.

Instead of engraving the resistors, a so-called "aspect ratio" technique has been developed. In this the whole of the plate is originally evenly deposited with resistor material. This is then sand-blasted away as required, to leave long, narrow rectangles for high resistances and short fat ones for low values. Electrical connections are made after shot blasting by the die-pressing of silver particles under heat.

A higher class of work altogether, as has recently been described, may be produced by firing thin platinum or gold films on to glass plates, and then etching.

Potted Circuits

The other important development in high productivity in electronic equipment is in the direction of assembling sub-circuits in sealed, self-contained bricks. This has the advantage of protecting each component against mechanical shock, vibration, the effects of humidity and other troubles. The sub-unit resulting is like a valve, in that it cannot be repaired: thus, the best layout for mass production may be adopted.

Plastics suitable for completely enclosing such bricks have been available for a comparatively short while. The "polyester casting resins" which are used do not require pressures or high temperatures to convert them from pouring fluids into hard plastics: the transformation is accomplished by the addition of a

* *"Printed and Potted Electronic Circuits," by G. W. A. Dummer, M.B.E., M.I.E.E. (Telecommunications Research Establishment) and D. L. Johnston, B.Sc.(Eng.), A.M.I.E.E. (Elliott Bros.).*

catalyst and accelerator. One disadvantage of the resins is their high temperature coefficient of expansion. To counteract this effect, there is a trend towards using an inorganic filler which greatly reduces the expansion.

Outcome

Some printed-circuit schemes are approaching the position where automatic means may be used to produce some 50-70% of a complete equipment. Testing after assembly is to be avoided where possible, which means that there must be no errors in the assembly process. Printed wiring helps here by eliminating wrong connections, but added components such as valves and capacitors must be tested before assembly. There is the advantage that a "drift" in any process may be observed, and corrections made, before limits are exceeded.

DISCUSSION

MR. T. R. SCOTT (S.T. and C.), who opened the discussion, referred to the use of potted and printed circuits in guided missiles and said everything should be done to bring these circuits into mass and rapid production, and low labour cost production. Nevertheless, he also hoped that they would find a peace-time, and less expendable, use. He doubted whether the electronics industry could find sufficient skilled maintenance men and thought the progress of electronics in industry might be impaired as a result. One of the problems which would arise was that when a defective component was discovered, would they have to throw away the whole of the sub-assembly? If the components were good, they might be too expensive to throw away; and if they were made cheaply, then the number of faults might increase.

MR. J. A. SARGROVE (Sargrove Electronics) explained that his aim, throughout his work in this subject, had been to achieve not necessarily miniaturisation but automatisation. The whole trend of his work had been almost completely to neglect maintenance and to build up the percentage of the good output in a very large quantity output. That was the philosophy of the valve-making industry, and frequently they achieved a percentage of 98% good valves.

DR. R. G. C. WILLIAMS expressed a word of caution against throwing overboard too readily the existing types of component. The component industry, he said, had been built up throughout the world from bitter experience, and that experience should not be lightly cast away. Potted and printed circuits had arrived out of quite an old principle—unit construction; and, indeed, to speak of potted and printed circuits in the same breath was a little misleading.

Dr. Williams said they had had experience of apparatus being produced on unit construction, the units being an attempt to split some complicated assembly for easier manufacture and servicing; and while, in the early days, these were bulky units, commercial receivers had recently been produced based on the unit principle but using standard components. Potting was a method of taking this further, in an attempt to hold the standard components together in an easier way by moulding or some form of stamped-out wiring framework. Printing, on the other hand, took the whole process much further.

The authors had not dealt with the cost of the process, but he thought that those who had experience of mass production would have been shocked by the labour costs involved in the precision of the manufacturing methods shown in the authors' film. They had a long way to go before they competed with traditional assembly methods.

MR. P. P. ECKERSLEY (Telephone Manufacturing Co.) asked how the new techniques could be applied to line transmission. If they could get some transmitting medium which would take much higher frequencies than they could put through open wires or cables at present, it would be far more possible to get standardisation of electrical circuits; and then it would be possible to adopt these new production techniques.

Dealing with temperature figures given in the paper, he said the temperature rise, which used not to exceed perhaps 8°, might now rise 20° if they were not careful.

MR. R. W. HARDISTY (Plessey Co.) thought they could not get very far at the moment with printed circuits. Printing wiring, however, contributed to uniform performance and eliminated a lot of inspection, and his group were producing hundreds of printed circuits a week, which were going into some of the assemblies on exhibition at the meeting. In potted circuits, the limitation seemed to turn on the cost of sub-miniature valves.

MR. R. J. HALSEY (G.P.O.) said the advantages in printed circuits with military equipment were unquestionable, but was there greater reliability in the new equipment, compared with conventional equipment, for civilian purposes, where the normal temperature and humidity variations were comparatively small? What was the reliability, and what was being sacrificed if they adopted some of the new techniques? In particular, what were the statistics of faulty joints?

Secondly, what was the cost, taking into account both initial cost and cost of maintenance? The Post Office had tried to use these techniques in printed switch bank wiring in automatic exchanges, but without success. Mr. Halsey spoke of work in connection with the single audio-frequency amplifier, but said the component values had to be large and precise, neither of which was an attribute of the printed circuit.

Mr. Halsey asked whether miniaturisation generally had consistently led to decreased costs. He believed it had, for the smaller they had made their equipment the cheaper it had become. Finally, and again on costs, was there an awkward curve in moving from conventional techniques to the new techniques? There had been a progressive decrease in cost with miniaturisation.

Would there be a further progressive decrease with printing and potting?

MR. F. S. BARTON (M.O.S.) spoke of the greater complexity of military equipment; a bomber which carried about 30 valves in 1939, now carried 1,300. Thus, it was important that equipment should be cheaply manufactured and easily maintained, or preferably not maintained at all. It must also be reliable.

BRIGADIER E. J. H. HOPPETT thought the two techniques were not necessarily associated for the future. There might be more of an application for potted techniques than for printing.

MR. F. R. W. STRAFFORD said a good radio engineer must have the ability to combine economics and techniques. While the new techniques had an application with guided missiles, he thought they would be accompanied by great production difficulties if industry attempted to use them in a wholesale manner.

Mr. Strafford said he did not agree that miniaturisation brought a lower cost to give the same results. The main item of cost in radio was labour—and whenever they tried to make something smaller, more labour was needed; or, rather, a more critical labour effort. It took longer and required more elaborate processes, which added up to the same thing. In his opinion, it cost more to make things smaller. In addition, he thought the potted technique would make trouble finding more difficult. There would be greater difficulty in pinning down a fault.

He asked for more information about the problems in moulding the plastic resin, which were important if industry were to explore these fascinating methods of production.

MR. L. LANDON GOODMAN emphasised Mr. Dummer's conclusion that this was a problem of production research. He was worried by the lack of production research at present, for we seemed to be going further and further into the field of pure research.

MR. J. A. SMALE said that some equipment was subject to severe vibration before it reached the public. As a consequence, wiring faults occurred. Was the new technique of printing likely to get rid of a lot of these defects?

Both Mr. Dummer and Mr. Johnson replied.

Foil Strain Gauge Developments

REFERENCE has been made in the ELECTRICAL TIMES during the last half year to the relatively modern technique of printed circuits. In August of last year mention was made of its application to resistance strain gauges for use in aircraft, and more recently other uses in the power engineering field have been discussed. In its first application, to that of aircraft research, Saunders Roe, Ltd., announce two new developments of the original technique widening its field of application considerably.

It will be recalled that one of the chief drawbacks to the wire resistance strain gauge was the relatively low resistance to fracture of the wire, especially at the junction of resistance wire and take out leads. This was successfully overcome by the printed foil strain gauge, in which end tags were a continuation of the wire resistance and provided a robust anchor for soldered joints. However, in the measurement of torque on shafts yet another difficulty is encountered—correct alignment of the axis of the gauge on the shaft under measurement.

The longitudinal axis of the small wire gauge has to be set, on the outside surface of the shaft, at an angle of 45° to its axis. Normally four gauges are used, bridge connected, to obtain as accurate a measurement as possible of surface strain round the whole circumference of the shaft for torque in either direction. To set, by hand, each gauge in its correct position, was a feat requiring no mean skill.

Recently, however, printed foil strain gauges have been developed which are sensitive to strain at only 45° and 135° inclination. Manufactured by Technograph Printed Circuits, Ltd., both types of gauge are printed on to the same backing in strips. For torque measurement, the required length is cut off, bonded round the shaft and connected in the normal manner, alignment of each end of the strip ensuring accurate inclinations of the gauge pattern with no need for marking the shaft. As each gauge length encircles the shaft completely, integration of circumferential strain is obtained, whereas the single wire gauges provided measurement at only four points.

Their second development is a diaphragm gauge which can be applied to the measurement of pneumatic or hydraulic pressures. It is a double spiral foil gauge, covering the whole diaphragm area which, whilst enjoying the advantages of the normal strain gauge, integrates circumferential stress over the complete area. Whilst this is stated to be suitable for stiff diaphragms, the more flexible types, having a more complex stress pattern, require a different approach. Connections to the diaphragm gauge, because of limitation in space, demand something less bulky than soldered take-out leads, and Technograph have manufactured a printed and etched conductive pattern in copper foil which overlays the gauge pattern, being soldered to it at appropriate points.

NOTES ON WIRING *by Megohm*

Light and Colour

COMING out of the dimly lit side streets into Piccadilly Circus in the late evening the transformation from gloom into gaiety is one that most visitors to London will always remember. Whilst some may take this wonderful scene for granted, many of us rejoice in the feast of colour and animated lighting effects provided for our pleasure and entertainment.

Effect on People

Lighting to be good must be cheerful, and I am in agreement with Mr. W. J. Jones, director of E.L.M.A., when he says more attention should be given to the quality of light, even if it is necessary to forgo, to some extent, the full lumen output of the light sources to obtain the desired result.

Some very important factors in addition to the factors used in the standard formula for calculating light intensities should not be overlooked. The primary consideration is that the people who have to live and work with the installations like the general lighting effect and are impressed with its cheerfulness. If this result is achieved, then there is no doubt whatever that better production can be expected, whether it be in the home, factory, or office, and maybe that feeling of tiredness and lack of interest that many people have been complaining about over the past years will subside.

Mercury Discharge Lamps

One of the greatest dis-services to good lighting has been the introduction of the mercury discharge lamp, under whose rays the most cheerful person is transformed into a figure of gloom and misery. If you have any doubt on this point, take a friend for a stroll along one of our public highways lit by this ghastly lamp. The general reason put forward for the use of this lamp is low running costs which, however, I do not consider is a justification for transforming a cheerful locality into one of gloom. The further point used to support M.D. lighting is that colour correction is to some extent achieved by the warm bright lights from shop windows which, of course, is a point that leaves much to be desired. These high-intensity M.D. lamps are also very disconcerting to motorists, especially on dark and wet nights, when the light source is reflected on the wet road surfaces and windscreens, producing the effect of several high-lights, which is most tiring to the eye.

There has been a drive over the past years to popularise mixed M.D. and tungsten light sources for the lighting of factory buildings and power stations. Again the main reason in favour of this type of lighting is the reduction in running costs and the increased lamp life. A point to remember is that while the lamp life of M.D. lamps is longer than that of tungsten lamps, so is the cost higher for replacement of the M.D. lamps.

Blended Lighting

A mixed lighting installation or, as it is now more often called, blended or corrected lighting, to achieve reasonable colour correction must have a predominance of tungsten and, as far as I can judge, the difference in running costs, compared with a complete tungsten installation, should not be ruinous. If a fluorescent or cold cathode installation is substituted, the running costs, of course, would be less and without question the colour and quality of the light would be much enhanced.

I understand M.D. and tungsten mixed lighting installations are being considered for the lighting of turbine rooms in generating stations. I hope for the comfort of the operations staff that an ample tungsten wattage is used to give good colour correction or, better still, why not substitute—as they are doing in the United States—cold cathode or fluorescent lighting installations for the lighting of turbine rooms, which, after all, are focal points and should be well and cheerfully lighted.

Economic Costs

The running cost of fluorescent and cold cathode installations will be small, lamp replacement will be less often required, and, since Mr. W. J. Jones tells us the cost of fluorescent lighting has been reduced to one-twelfth of what it was in 1932, I wonder what is preventing the general adoption of these excellent modern methods of lighting. Can it be the high capital cost of fluorescent and cold cathode lighting equipment and lamps?

Portsmouth College *EXTENSIONS*

EXTENSIVE WIRING INSTALLATION IN THESE MODERN BUILDINGS

REFLECTING present-day trends in architecture in its modern appearance, the recently completed extensions to the Portsmouth Municipal College offer in the extensive electrical installation a considerable scope for study to the electrical engineer. The extensions consist of a main building, constructed in reinforced concrete, and, to its rear, engineering workshops and laboratories. Considerable difficulty was encountered soon after the start of the work due to the previous existence of a canal under the site. This, however, was overcome by driving piles into the bed of the canal to act as bearing points for foundations.

Architecturally, the workshops are of greater interest. Set on top of the piles is a concrete cap on which slender reinforced concrete columns were set in position. These columns act as springing points for the barrel vault roofing which, semi-circular in cross-section, has spans of 30 ft. The main building, however, is not entirely without its features, of which the most notable is a staircase of concrete suspended on oak-encased steel rods from the first floor, to provide access to the public restaurant. This part of the building projects forward from the main body, itself constructed on an arc of 300 ft radius, and both first and second floors project farther over the entrance hall.

To supply workshops in several branches of engineering, domestic science equipment and power and lighting for the college's classrooms and drawing offices required an installation both complex and complete. The contract for this installation was held by Messrs. Edward Wolf and Son, Ltd., who worked to a design prepared by the Southern Electricity Board.

Supply at 440 V, 3-phase, is brought to the main switchgear distribution board, terminating at a 600 amp oil circuit-breaker. Manufactured by G.M. Engineering (Ottery St. Mary) Ltd., this board is their standard design, incorporating busbar distribution along the length of the frame to supply the various main switches for different parts of the building. A single kWh meter is used.

Feed to o.h. busbar trunking in carpenters' shop

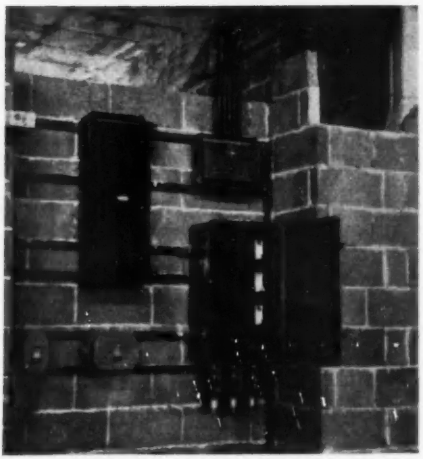
Underground busbar trunking in main engineering workshop

Ring Main for Ground Floor

A ring main, of 0·15 sq in. p.i.l.c. armoured cable, supplies the ground floor, each end fed through a 400 amp o.c.b. on the main board. Five tapping points on the ring main are provided in its travel through underground ducts to supply the main building and workshops. Feed off the main is through link boxes, connected to 150 A main switches fitted with h.r.c. fuses, from which v.r.i. cable in conduit connects subsidiary boards. In the main building two such points are located in each wing, built into the corridor wall. Each classroom is provided with its own fuse board, mounted, for accessibility, in the corridor about 7 ft from the floor. These boards supply two

flush fitting M.E.M. 13-amp socket-outlets, and fluorescent fittings for each room. For Classrooms, these number ten, providing an illumination of 15 lumens/sq ft, but in drawing offices the more exacting nature of the work demands the higher level of 20-22 lumens/sq ft obtained by the use of some 14 or 16 fittings.

Socket-outlets, of which a considerable number have been used, both in classrooms and corridors, are all of this type to effect a measure of standardisation. Similarly, standardisation of sub-circuits supplying these and lighting fittings has



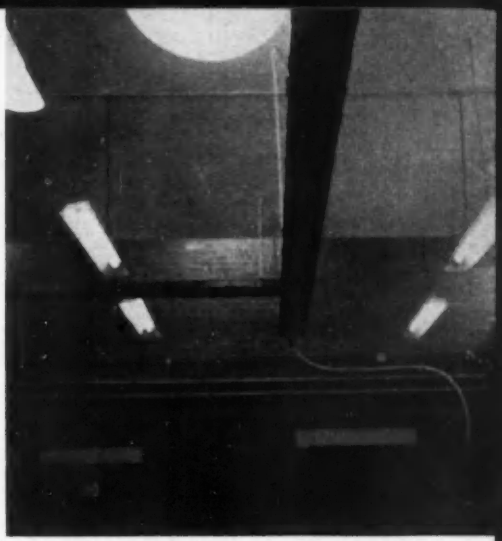
Sub-main boards in one wing of main building (now enclosed). The link box (right) is looped to the 150 amp switch in p.i.l.c. cable

been adopted to simplify the work wherever possible. All conduit is heavy gauge, screwed and galvanised, although shortages of the screw barrel type necessitated some use of hard-drawn conduit. Cables are 7/029 v.r.i. for socket-outlets and lighting fittings throughout.

Light Fittings on Barrel Roofing

In the various workshops, of which the main architectural feature is barrel vault roofing, the main power supply is conveyed by busbar trunking, suspension hooks being embedded in the concrete. One variation from this practice is to be found, however, in the main engineering workshop, where built-in office rooms precluded the use of overhead trunking. In this case, the trunking has been laid in troughs in the floor, the trenches being fitted with sheet-metal covers. Passing under the office partition walls, two lines of the trunking run the whole of the building, supplying machine tools mounted along its length.

Supply for the underground trunking is fed in 37/072 v.r.i. cable run in surface channel conduit and controlled by Rotorcon 150 A switches fitted with h.r.c. fuses. For overhead trunking, however, 0·1 sq in., p.i.l.c. cable is used from a 150 A



Overhead busbar trunking in carpenters' shop

switch fed by p.i.l.c. armoured cable from the section link box. The contractor's work terminates at feed points along the trunking, the responsibility for connecting machines and other engineering equipment to the supply being divided between the college's and the City Architect's electrical departments.

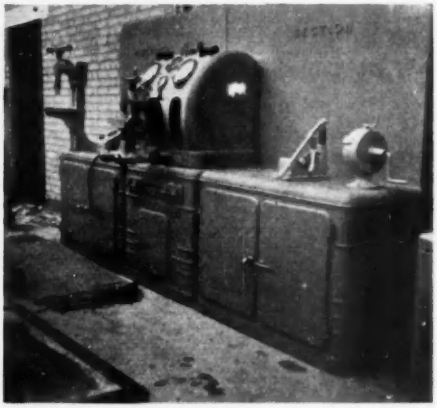
Surface wiring for all purposes was necessary in workshop buildings in view of their construction—brick walls and barrel roofing. Fluorescent lighting has also been provided, the average illumination on the working plane being 20 to 22 lumens/sq ft. Conforming to the same standards as those adopted in the main building, the conduit has been run along the roofing, its shape presenting few installation difficulties. Each fitting is suspended from ceiling boxes and has been thus hung either at right-angles or parallel to the roofing.

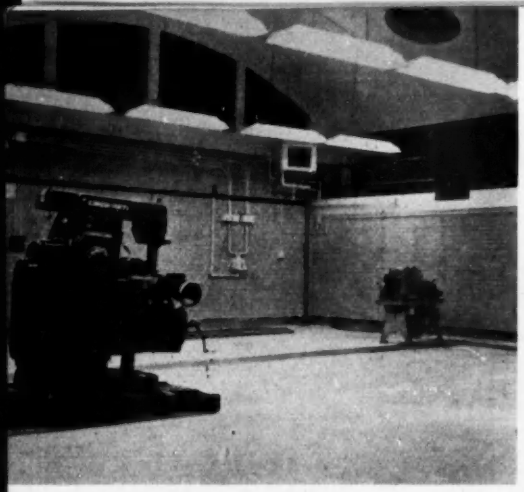
Workshop Supplies

There is some variation in methods used to supply workshop lighting distribution fuse boards. The main supply is taken through the wall and run in conduit either direct to the board or through a main switch. In most cases, however, the workshop is controlled by a 100 A t.p. and n. Rotorcon switch fuse wired in 19/064 v.r.i. run in conduit, feeding distribution boards for other sub-circuits in addition to that for lighting. Wiring for these other services is again the responsibility of the City Architect's staff.

Similarly, methods used to supply individual workshops depend on varying factors so that some differences may be found from workshop to workshop. In some cases the supply is run in v.r.i. in channel conduit along the corridor wall and entering through it, in others the cable is run in ducts beneath the corridors and brought up through the floor. The system is similar to that in the main building, each link box feeding a 350 A t.p. and n. switch fuse fitted with h.r.c. fuses. From these the workshop supplies are fed through a 150 A, 6-way distribution board.

(Left) Surface main switchgear and distribution boards in engineering workshop
(Below) This illustration shows the excelleht level of lighting in the main carpenters' shop





Hydraulics laboratory showing main board

It is in the boiler room, however, that the greatest departure from the general practice may be found. This has been due to precautions taken to prevent flooding, a possibility which, in view of the site, was considered imminent. Three walls and the floor have been waterproofed in consequence, and as any puncturing of the lining renders it useless, only the remaining wall and the ceiling were available for mounting conduit and fittings. Moreover, as a considerable power installation was required in the boiler room, the problem of supply was by no means easy.

It was overcome by using two runs of suspended channel conduit supplies to various motors and for other purposes being dropped in ordinary conduit. Angle-iron stubs fixed to each motor bed-plate provided the means by which each conduit drop was supported at its lower end. In all, some ten motors were thus supplied, four 2½ h.p. motors required to power Riley Stokers on the four boilers and six others, ranging in size from 2 to ¾ h.p., power hot-water circulating pumps. In addition, supplies to motorised values in the central heating pipework and lighting fittings are also run in the channel conduit.

These feeds originate at a single frame carrying distribution boards for power and lighting, motor starters and contactor control gear for regulating the temperature of the central heating system. V.r.i. cables run in a 2-in. conduit connect the board with a 60 amp t.p. and n. switch on the main board.

All control for the central heating system is electric, as is the measurement of heat flow, for which B.T.U. and flow meters have been installed in a small room off the main boiler room. In addition, six float switches have been installed, to provide warning in the event of flooding.

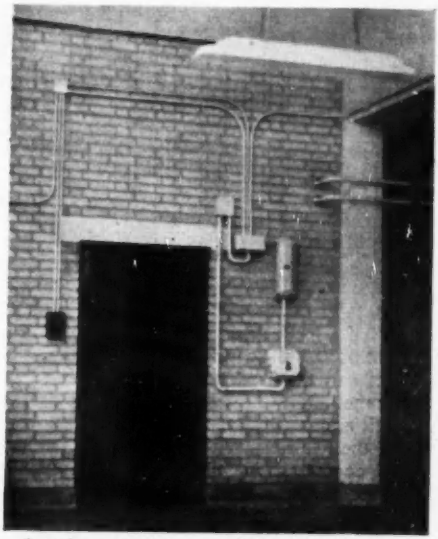
Supply to first and second floors is by 0·15 sq in. p.i.l.c. a. cable, each from a 100 amp switch on the main board, terminating in 100A t.p. and n. distribution boards, four-way and three-way respectively. The public restaurant, students' cafeteria and kitchen occupy most of the first-floor front, although of course, classrooms are found in each wing. To meet these twofold requirements, extensive kitchen equipment has been installed, including a 12 kW pastry oven, three 6 kW steamers and a complete range of smaller accessories.

Supplies for this installation are taken in 2½-in. conduit to the kitchen area from which distribution boards meet individual requirements. The three steamers are wired in 7/064 v.r.i. cable from a four-way board to form a balanced 3-phase load, and the pastry oven from its own fuse board in 19/044 v.r.i. cable. Separate 15 amp fuse ways in a separate board supply all other equipment. In view of the unpleasant effect of fluorescent lighting on food during its preparation, all kitchen illumination is provided by tungsten filament sources in spherical fittings. In the public restaurant and college cafeteria, however, fluorescent lighting is again adopted, but with fittings identical with those used elsewhere for classrooms and

workshops. A hanging ceiling for the restaurant has been utilised for conduit runs, departing from other methods used to conceal wiring.

Domestic Science Installation

Demonstration and workrooms for domestic science occupy the second floor above the restaurant. In the larger of the two demonstration rooms, five 12 kW cookers are the main items of equipment, but due to unanticipated changes in the specification, supply to these appliances has, of necessity, to be run on the surface, in 19/052 t.r.s. cable with included earth wire. Originally, 3 kW cookers were to have been installed and concealed conduit was wired accordingly. Later, the decision was made to increase the cooker size to 12 kW, necessitating this surface wiring. The wiring is run

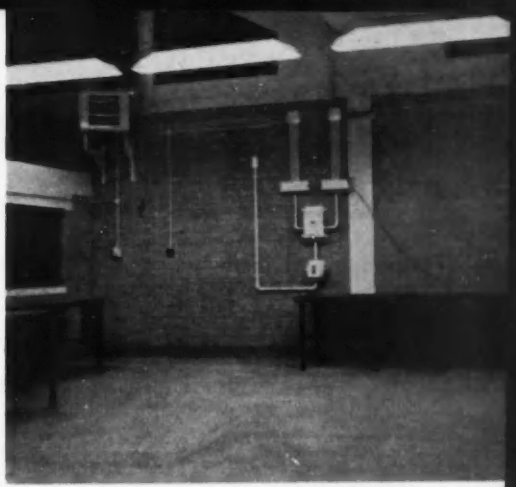


Switchgear position and lighting distribution

on wooden battens and covered with metal screening to provide the necessary mechanical protection, whilst M.E.M./A.C. 60 amp single-phase and neutral switches fitted with h.r.c. fuses provide the main control for each cooker.

Adjacent to this room is the college's dressmaking classroom, in which a total of 12, 13-amp socket-outlets have been provided round the walls for sewing machines. Four circuits, each supplying three points have been thus wired, in 7/029 v.r.i. cable in concealed conduit. Provision for ironing has been made by a further eight 13-amp socket-outlets located near two special ironing tables.

An up-to-date feature of this college is its small domestic flat, designed for demonstration purposes, built above the second floor. This has been wired in accordance with normal domestic practice, using a consumer's control unit. Apart from



Main switchgear position. Note lighting across roof vaulting

globe ceiling fittings for tungsten filament lamps, provision is made for table lamps, a cooker and electric fire. Running through the flat is the third rising main, in 0·15 p.i.l.c. armoured cable from a 30-amp three-pin and neutral switch on the main panel. For the lift motors, it is conveyed in concealed channel conduit through the flat to the two motor rooms above. These, one each side of the lift shaft, house also motors for the air-conditioning plant. The rising cable terminates in one of the rooms, a 37/022 v.r.i. cable looped in to supply the other.

Entrance Hall Lighting

Another feature of the building is the indirect lighting of the entrance hall. The fittings, supplied by Merchant Adventurers of London, Ltd., consist of four inverted reflectors mounted on radial arms from a central support, which illuminate a semi-spherical bowl recess in the ceiling.

Also a part of the college installation is its d.c. supply, provided by an English Electric steel bulb rectifier having a maximum rated output of 75 kW at 240 V d.c. This is fed by a 0·15 sq in. p.i.l.c. armoured cable from a 150-amp switch on the main board conveyed through the ducts to the rectifier. The d.c. supply, used both in workshops and ground-floor rooms, is conveyed by a ring main of 0·1 sq in. paper insulated aluminium-sheathed cable supplied by Johnson and Phillips. A T-junction connects the cable with its isolating switch and fuses.

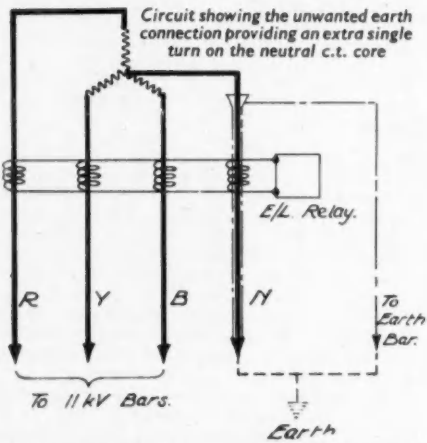
Apart from this ring main cable, all cables were supplied by Siemens, including special cables for the boiler room flooding alarm system and B.Th.U. measurement. Fluorescent fittings, using Cryselco natural lamps, are of Courtney Pope manufacture. They are used in all classrooms, workshops and main rooms, whilst spherical tungsten fittings were considered sufficient to meet the requirements of corridors and small rooms. Emergency lighting is provided by 26 bulkhead fittings, fitted with 50 V tungsten lamps and supplied from batteries.

PROBLEMS AND PRACTICE in Engineering

Balanced Earth Leakage Protection

IN the course of installing a new star-delta transformer recently, the writer had to carry out a commissioning test on a balanced earth leakage system.

The c.t.s were tested for correct ratio in the normal manner and found correct. When tested for polarity, however, it was found that with all four c.t.s in parallel a spill current flowed between the two star points which, whilst it was sufficiently large to cause a maloperation should a through-fault occur, was not of sufficient proportion to be attributed to any one c.t. being connected in opposition to the others. Elimination tests showed the source of the trouble to be the neutral c.t. which was of iron-clad slip-over



Circuit showing the unwanted earth connection providing an extra single turn on the neutral c.t. core

pattern whilst the line c.t.s were of the standard oil-immersed bar primary type and were housed in the switchgear.

Exacting tests were carried out on the neutral c.t. and with the ratio still showing correct other causes were sought. The root of the trouble was finally tracked down to the fact that besides the lead sheath of the star-point to earth cable being bonded to earth, an over zealous jointer had also bonded the star-point cable gland to earth, thus putting a further single turn secondary winding on the core and causing a phase displacement of the original secondary current. The spill current which had been recorded was the vector difference between the secondary current of the neutral c.t. and the secondary current of the line c.t.s. With the removal of one of these bonds the spill current disappeared.—*K. R. C.*

Lift Defects

ACCORDING to Mr. Hartley's diagram in the "Problems and Practice" columns of the January 1 issue, an earth fault anywhere in the circuit from the contactor coils to the gate lock contacts would enable a current to flow through one or other of the contactor coils so causing the lift to move. Furthermore, with any landing gate open, the fault current would be limited by the impedance of the coil and would be insufficient to blow a fuse or trip the circuit-breaker, unless, of course, the fault was between the open gate and the other line of the supply when a large fault current would flow.

As a number of accidents have occurred due to earth faults in lift control circuits which caused the lift to move away from an open landing gate or door, it is important that the gate lock circuit should be so arranged that an earth fault in the circuit will not render the gate locks ineffective as it can when, as in the case reported, the contactor coils are connected directly to a "live" pole. The usual and far safer method is to earth one side of the control circuit and connect the contactor coils to this side, the live side being connected to the gate lock contacts. As the coils will evidently operate on phase voltage in the case referred to, the neutral and one line could be utilised instead of two lines of the three phase supply, the neutral being connected to the coils and the line side to the gate locks. If the neutral is not available, or if the voltage between phase and neutral is not sufficient to hold the contactors in without core vibration and chatter taking place, a double wound transformer could be used and one secondary phase earthed.

It is now common practice to use d.c. control equipment with a.c. lifts, a metal rectifier having the negative pole earthed being supplied with the control panel and the contactor coils are connected to this pole.—*S. Woodhouse.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

Orders and Output — 1952

THE ENGLISH ELECTRIC CO. LTD.

INCREASED steam pressures and temperatures, together with larger maximum set size is reported in this year's review of the activities of the English Electric Company. In this category, work progressed on the 1,500 lb/sq in., 1,050° F, 3,000 r.p.m. 100 MW unit for Willington, and among the year's B.E.A. allocations were a second 100 MW set for the same station, a fourth 60 MW set for Wakefield, a 60 MW set for Belvedere and two 30 MW sets for Mexborough.

Noteworthy among the orders for other purchasers was one for a 15 MW back-pressure set required by the Bowater Paper Corporation. This 3,000 r.p.m. machine will operate with a steam pressure at the stop valve of 1,500 lb/sq in. and will provide exhaust steam at the remarkably high pressure of 370 lb/sq in.

Plant commissioned at home during the year for the B.E.A. totals some 275 MW; this figure includes the third and fourth 50 MW hydrogen-cooled sets for Bromborough which operate at 900 lb/sq in., 900° F. Abroad, the second 60/66 MW, 3,600 r.p.m. set for the Windsor station of the Hydro-Electric Commission of Ontario was commissioned and the third set for this station is now being erected. Three units of the ten sets on order for Vierfontein are in process of shipment and erection, and the first should be running early this year. When completed, the station will have an installed capacity of 300 MW comprising ten 30 MW units all of E.E. manufacture. South African orders include a fourth 30 MW set for Pretoria "B," and a 10 MW set for Shabani, S. Rhodesia. Two 5,000 kW units were ordered by the Sudan Light and Power Co. Sets commissioned, or ready for running abroad, include the first two 30 MW sets for Pretoria "B," a 30 MW set for Vanaja (Finland), the first 15 MW set at Basin Bridge (Madras) and a 30 MW set for Salmisaari (Helsinki).

Switchgear

In the switchgear field, orders continue to be heavy. Outdoor oil circuit-breakers were required for service on voltages between 11 and 88 kV by Australia, South Africa, Greece and the home market. In the last-named, the demand was particularly heavy for 33 kV breakers. A similar demand was also in evidence for indoor metal-clad gear, particularly that for operation at the 11 kV 350 MVA level.

Air blast equipment also continued popular, and various 132 kV units were ordered by the B.E.A., while orders were also received from Australia and Spain. In the higher voltage field was an order for a 220 kV substation with six circuit-breakers for a hydro-electric scheme abroad. Many circuit-breakers were installed during the year; 165 kV air-blast in Holland, France and Spain; 132 kV in Australia, Spain and Great Britain and 138 kV breakers were delivered to the H-E Power Commission of Ontario.

Auxiliary switchgear of the 3·3 kV and 415 V air-break type has been supplied by the Liverpool Switchgear Works of the Company to several power stations and for industrial use. One of the highlights of the year was the successful testing of the OB33L 3·3 kV air circuit-breaker for a rating of 150 MVA.

Large and small transformers up to 275 kV and 120 MVA have continued in demand both at home and abroad.

Industrial Plant

Many orders were received for electrical equipment for cement mills, sugar factories, oil refineries, pumping schemes and so on. One order, for example, covered the complete electrical equipment for a large new oil refinery in South Africa. Another order for the same destination was for two 40 MVA, 1,000 r.p.m., 11 kV, synchronous condensers.

Industrial motors have continued in heavy demand, and in the metals industry a considerable number of equipments have been put into operation, and interesting orders obtained. In Australia, a 7,000 h.p. blooming mill drive is now running—the second of its kind delivered to a particular customer—and further heavy plant is now operating in Sweden. At home, hot mill drives commissioned include those for a continuous copper rod mill and a semi-continuous aluminium mill. The former has four 210 h.p. motors and an 850 kW grid-controlled rectifier, whilst the latter equipment has two induction motors for roughing and intermediate drives, and seven 150 h.p. d.c. motors, with an m-g set, for the finishing train.

Cold mill equipments include those for a

1,500 h.p., 100 ft per minute, 50-in. wide aluminium strip mill with a 300 h.p. coiler, and, for stainless steels, a 400 ft per minute reversing Sendzimir mill with 600 h.p. main motor and two 430 h.p. coiler drives. Several large orders for mill equipment are being completed abroad.

Mine winders and haulage plant orders have continued on a satisfactory scale, the majority being for various divisions of the National Coal Board. Although Ward Leonard winders in the 1,700/1,900 h.p. range formed part of this business, a number of geared a.c. winders were also ordered with motor outputs ranging between 200 and 1,300 h.p. An unusual feature in this field was the receipt of orders for mobile emergency winders, one being a 95 h.p. diesel electric unit and another a 150 h.p. a.c. driven unit. A repeat order was received for a direct coupled drive of 1,860 h.p. for a 23-ft dia Koepe pulley. This N.C.B. installation will wind 185 tons/hr from a depth of 3,000 ft.

Hydro-plant

A further nine water turbine generating sets and one water turbine have gone into commission or are complete ready for service. At home, the third 22 MW set at Fasnakyle was commissioned and two 1,000 kW sets went into operation at Lussa.

In Spain, the third 40 MW unit at Cofrentes was completed, and in Portugal the third units went into operation at Castelo do Bode (45 MW) and Vila Nova (39,000 h.p. turbine). At Kolhapur (India) two 1,500 kW units were commissioned and the other two units are ready for service when load is available.

Orders for Tasmania include three 56,000 h.p. turbines driving 46 MVA alternators for Wayatinah and one 42,000 h.p. turbine coupled to a 35 MVA alternator for Lake Echo. In Alberta, John Inglis Co., a Canadian associate, is to build a 30,000 h.p. water turbine for Ghost River Extensions.

Traction

Orders for electric locomotives during the year have included 2,000 h.p., 3,000 V machines for South African Railways, further 3,600 h.p., 3,000 V units for Spanish National Railways and flameproof battery locomotives for the N.C.B. The Victoria Government Railways have ordered traction motors and control equipment for 750 h.p., 1,500 V d.c. motor coaches. Deliveries during the year included motor coach sets for British Railways S.R., and three coach trains for Brazil. Spain has taken delivery of 3,600 h.p., 3,000 V locomotives.

In the diesel electric field, power equipments have been supplied and are on order for several 400 h.p. shunting locomotives to be built by British Railways. Large units on order are 1,500 h.p. mixed traffic locomotives for the Parana-Santa Catarina Railway (Brazil) and 2,000 h.p. mixed traffic locomotives for Rhodesian Railways. Among several smaller diesel electric equipments delivered were the 800 h.p. five coach suburban trains for the Egyptian State Railways.

Trolleybus equipment supplied during the year included 120 h.p. sets for Glasgow Corporation, control equipments for NESA (Denmark) and 125 h.p. chassis and equipments for Nijmegen Municipality. An order was received, among others, for 150 h.p. sets for Huddersfield Corporation.

Electronic Equipment

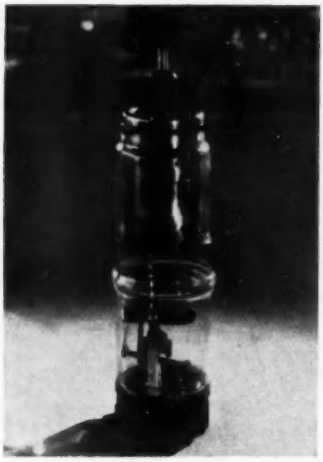
The air-cooled, sealed, steel-tank, mercury-arc rectifier continued popular. Norway ordered two 4,800 amp 750 V grid-controlled equipments for aluminium production and two 2,000 kW 600 V equipments for driving a semi-continuous steel mill. Other equipments have been ordered for traction, mills, shipyards, factories and so on. Excitrons have maintained their predominance for high voltage supply in large radio transmitters.

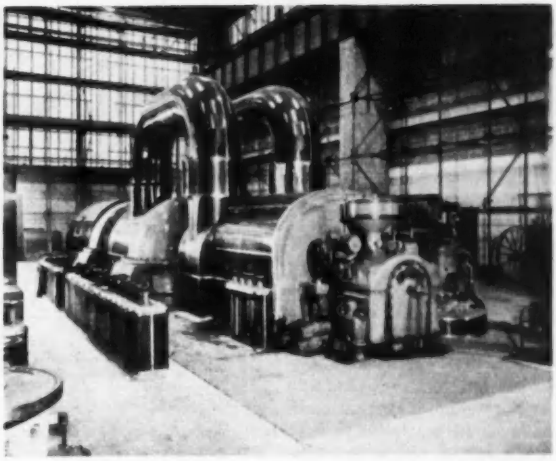
A range of electronic controllers has now been established to cover d.c. motors from 3-100 h.p. for variable speed drives, and these controllers have been used successfully in applications connected with steel mills and textiles. In the f.h.p. range ($\frac{1}{4}$ and $\frac{1}{2}$ h.p.) the "Magamp" controller using magnetic amplifiers has been developed. The 10 and 25 kW electronic heat generators in induction and dielectric versions are being followed by a 50 kW heater.

The potentialities of television abroad are being studied, and regard is being paid to the introduction of new models in the lower priced category.

Apart from the electrical items given above, the Company is, of course, proceeding with the production of Canberra bombers, domestic appliances, welding plant, diesel engines and marine engines.

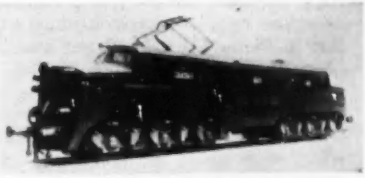
The Fusegear Works has continued to manufacture large quantities of h.r.c. fuses and fusegear for use in power stations, steelworks, chemical and other industrial plants and for the Area Boards of the B.E.A. Increased shipments were made to overseas markets.



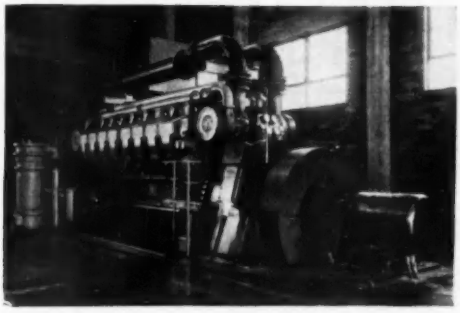


Above, left: *Type AR63 high-voltage pool cathode mercury arc rectifier*

Above, right: *30-MW set at Blackwall Point generating station, seen from turbine end*

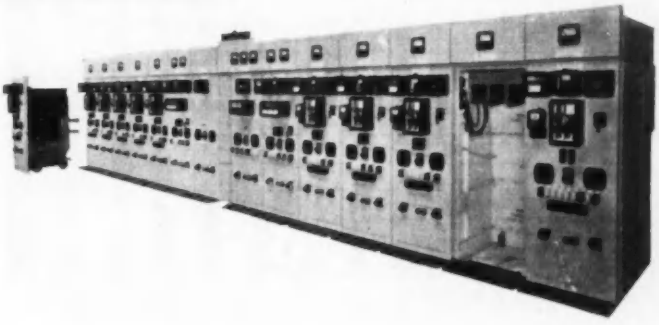


Above: *One of 60 3,600-h.p. 3,000 V d.c. locomotives for mixed traffic duties for Spanish National Railways*



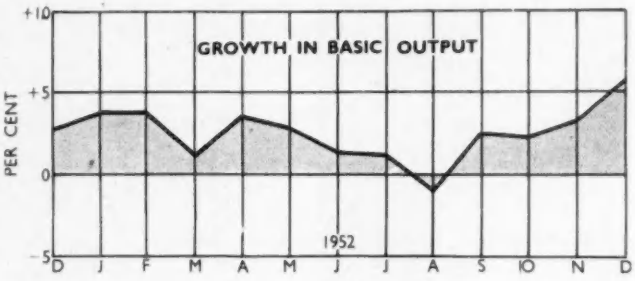
Left: *This 16-cylinder pressure-charged V-type diesel engine coupled to an 810-kW alternator is designed for standby duty in a South African goldfield*

Right: *This panel floor mounting switchboard, incorporating Type OB 33 (L) 3·3 kV 150 MVA horizontally draw out truck type air circuit-breakers has been installed at the Trostre works of the Steel Company of Wales*



BASIC LOAD GROWTH

The accompanying curve shows how the energy sold by the B.E.A. in the past 12 months has compared with that of the corresponding month a year earlier. The figures used for plotting are first corrected for the effects of temperature and for the number of working days included in the calendar month. Thus the points marked are an approximate measure of the basic rate of load growth being experienced by the B.E.A.



Power Supply in December

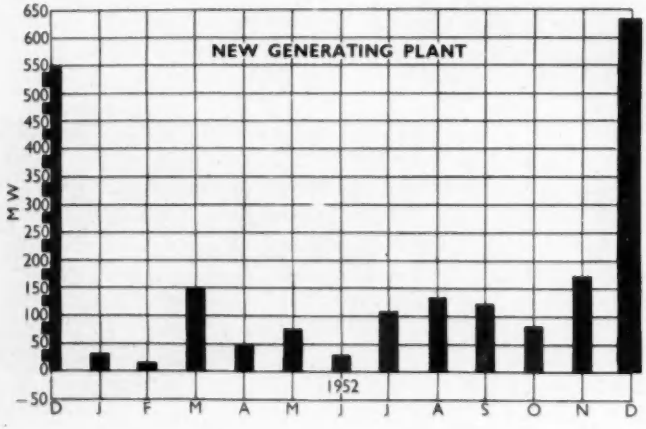
ALTHOUGH in the first week of December, temperatures were well below those experienced in 1951, in the latter part of the month there was little difference. The heavy foggy weather, however, must have caused an abnormal consumption in most industrial areas due to the additional lighting load. Demand rose, despite the incidence of the Christmas holiday, to 6,195 m units for the 31-day month, compared with 5,646 m units for November with 30 days. This heavy loading has had the effect of bringing the percentage increase in units sent out for the year up to 3·9% compared with 2·9% in the previous month.

Plant and Load

As is now becoming almost traditional, there was a great commissioning spurt during the month for new plant, and no less than 631·5 MW of new turbo-alternator capacity went into operation during the official period. Such a heavy loading has made it virtually impossible to deal with the individual details and we have there-

B.E.A. SALES TO AREA BOARDS IN DECEMBER

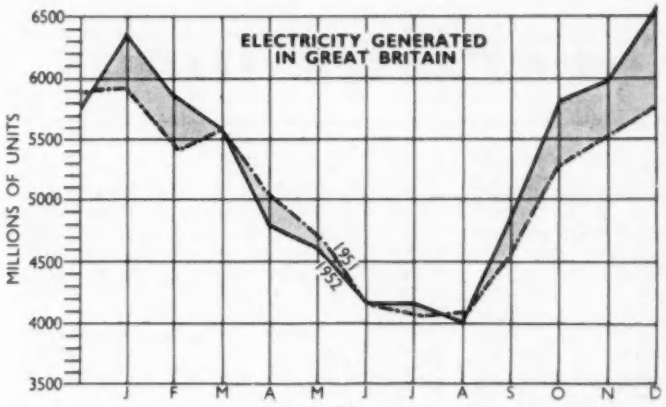
Board	Dec. total in million units	% in. or dec. on Dec. 1951
London	614·9	+15·5
South Eastern ...	351·1	+16·3
Southern	403·4	+18·0
South Western ...	190·0	+15·9
Eastern	566·1	+18·2
East Midlands ...	457·0	+16·3
Midlands	608·1	+14·2
South Wales ...	297·0	+7·8
Merseyside and N.W.	334·8	+6·2
Yorkshire	586·9	+15·4
North Eastern ...	347·9	+6·5
North Western ...	651·9	+7·5
S.E. Scotland ...	135·6	+12·4
S.W. Scotland ...	335·1	+14·6
Direct Sales	66·5	+11·8
Grand Total ...	5,942·4	+13·3



GENERATING PLANT

At the end of December, 1952, the installed capacity of the B.E.A. was 17,180 MW, showing an increase of 573 MW during the month. During this same period the North of Scotland total remained constant at 643 MW. The month's commissioning figures bring the overall increase during the past twelve months to 1,495 MW, or 9·2% of the total at the end of December, 1951.

The total installed capacity used for the purposes of this graph is the total m.c.r. of all the generating sets which are connected on both steam (if appropriate) and electric sides and are suitable for service.



UNITS GENERATED

6,563 million units was the total generated during December in stations under the control of the B.E.A., the North of Scotland H.E. Board, and the Lochaber Power Co. The corresponding figure last year was 5,762 million units.

Of the total, 6,383 million units was generated in steam stations and 161 million units in hydro-electric.

Energy sent out during the month was 6,195 million units, 94·2% of that generated. This gives the total for the year as 58,802 million units, showing an increase of 3·9% over the total for 1951.

fore summarised these in tabular form opposite.

With reference to the Area Board figures, some major changes in supplies have taken place during the past two years, and the effects of these are still apparent in the percentage increase or decrease in sales. In the Southern area, part of the increase in the twelve-monthly figures is due to the new oil refinery at Fawley which came into initial operation in the summer of 1951, and which has been taking an increasing load as more units come into use.

PLANT COMMISSIONED DECEMBER

Station	Sets. MW	Boilers. klb/hr
Bankside ...	1 60 B.T.H.	
Battersea ...		1-425 B. & W.
Brunswick Wharf	1-52·5 M.V.	1-320 Clk. Chapman
Uskmouth ...	1-60 G.E.C.	1-360 B. & W.
Brighton ...	1-52·5 R. Westgarth	2-320 B. & W.
Littlebrook ...	1-60 Parsons	2-360 I.C.L.
Plymouth ...	1-31·5 M.V.	1-320 Yarrow
Bromboro' ...	1-50 Eng. Elec.	
Thornhill ...	1-45 Eng. Elec.	1-200 Mitchell
Blackburn ...	1-40 Eng. Elec.	1-150 S. Carves
Huncoat ...	1-30 G.E.C.	
Woolwich ...	1-30 G.E.C.	2-180 J. Thompson
Northampton	1-30 Parsons	
Clarence Dock		1-350 B. & W.
Warrington ...	1-30 Brush	
West Ham ...		1-180 J. Thompson
Staythorpe ...		1-240 B. & W.
North Tees ...	1-60 Parsons	1-360 B. & W.

Heavy Industry

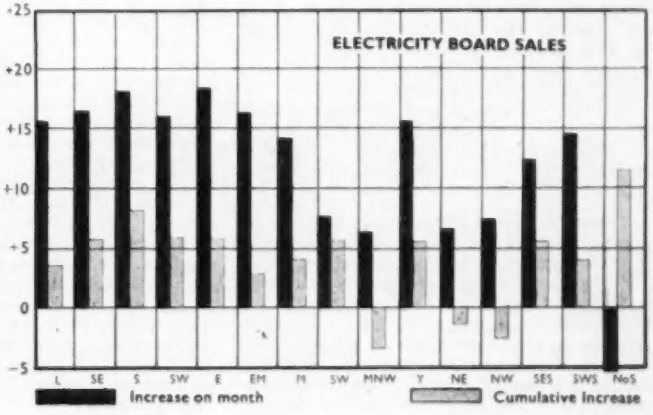
In South Wales, supplies to the steel works at Margam and Trostre are still showing an effect on the yearly figures, and a reduction in demand by one large consumer is reflecting in both the monthly and yearly figures.

Extensions to private generating plants are causing some load decreases in Merseyside and North Wales and in the North Eastern areas, but in Yorkshire, improvements in the textile trade have caused some increases.

DECEMBER SALES

Progress in the sales of energy by the British Electricity Area Boards and by the "North of Scotland" (N. of S. H.E. Board and Lochaber Power Co. together) are represented here. The two columns for each entry indicate, respectively, the bulk supply of electricity (or the total generation, for the North of Scotland) taken in December, 1952, as a percentage increase on the corresponding 1951 figure; and the same comparison for the cumulative totals based on the financial year.

It should be noted that the B.E.A. financial year runs from April 1, while that of the North of Scotland has been taken as the calendar year.



overseas news

Canada's Power Progress

New power facilities commissioned during 1952 brought Canada's total installed capacity to 14,304,230 h.p., some 8% above the figure of a year ago, according to the Resources Minister, Mr. Winters. New plants and extensions scheduled for operation in 1953 total 860,000 h.p. while other developments under way or planned for later years, exceed 2,000,000 h.p. The greater number of new power installations commissioned in 1952 were located in Quebec, where plant totalling 597,000 h.p. went into operation. In Ontario, the Hydro Electric Power Commission has reported that the first seven of eight units were placed in operation at the Otto Holden power station on the Ottawa River; another set was started up at both the J. Clark Keith and the Richard L. Hearn steam stations.

New Project for N.S.?

One of the largest power developments undertaken in recent years in Nova Scotia is being planned for the Nictaux River, by the Nova Scotia Light and Power Co., it has been reported. The Nictaux has already been harnessed for power, but the new development will involve an 80-foot dam and will vastly increase the present output, it is stated.

Commission's Interest

Officials of the Hydro-Electric Power Commission of Ontario are closely watching the actions of the Detroit Edison Co. which has announced that it hopes to be ready to start work this year on the continent's first industrial atomic power plant. Nuclear power stations have already been relegated to third place in the Commission's priority list, in view of the high cost involved and other factors. The Commission's experts agree with Detroit Edison's estimate that solution of many unknowns in the undertaking will probably mean it will be five to ten years before an atomic power plant is operating on a commercial basis. But the Commission has to bear in mind that the St. Lawrence River is the last major source of cheap water power within economic transmission distance of Ontario cities.

E. German Power Shortage

The electricity supply position in the Russian controlled zone of Germany is the subject of a recent report of the East German Control Commission, we learn. Anticipating a severe power shortage, private consumers are to be restricted still further, and industries must send in estimates of their minimum power requirements, apparently. An East German Governmental investigation was recently concluded and resulted in the chief blame being placed on the State Department for Machine Production. It has already been announced that production of turbines and generators, in particular, had been unsatisfactory. This new report indicated that, in fact, only 30% of the planned production was achieved last year and that the necessary component parts for much of this machinery are still lacking. The Government Department for Coal and Power is blamed, too, for failing to carry out an adequate repair programme, and for not providing proper quantities of coal at many East German power stations.

Lamp Factory Closes

The Philip's electric lamp factory in Israel is to be closed down. This decision has been made by the head office at Eindhoven, following a disagreement between the company and the Israeli Government over the allocation of foreign exchange. The lamp manufacturing plant is to be transferred to South America, apparently, but it has not yet been decided in which country it will be set up.

Turkey's Railways

The Turkish Minister of Public Works has a number of constructional projects under consideration. Included among these is a plan to electrify some of the main lines on the Turkish railways, including the Ankara-Istanbul line, and, at a subsequent date, the Ankara-Zonguldak line.

Plant Manufacture

Still interested in the prospect of making its own heavy electrical plant, the Government of India has decided to invite representatives of Associated Electrical Industries (India), the Westinghouse Electric International Co., and the International General Electric Co. of the U.S. to bring up to date their project reports on the manufacture of heavy electrical machinery. The Government is seeking later information relating to the cost of the project and whether the companies are still prepared to provide technical and financial assistance. The decision to undertake the manufacture of heavy electrical equipment in India was originally taken by the Government early in 1949, when an approach was made to the concerns mentioned. At that time it was envisaged that it would be five years from starting the project before production could be expected to commence. It was recently stated that it was anticipated the project would be completed in three stages, having a total capital cost of about Rs. 600 million.

Early Work at Karnafuli

In connection with the Karnafuli hydro-electric and flood control project, Pakistan, work has begun, under the auspices of the Public Works Department of the East Bengal government, on the two coffer dams and the preliminary diversion canal. This early work was begun a short time ago, but has lately been speeded up considerably, for it has developed into a race against time. For unless this stage is completed quickly the work is likely to be demolished when the monsoon comes. There are strong hopes now, however, that such a calamity will be averted. After the monsoon, perhaps in August or September, the larger task of constructing the 127 ft high dam can be tackled—provided a capital grant for carrying out the work is approved. As planned, the Karnafuli project will have an ultimate capacity of 120 MW. It is considered to be a vital part in the industrial development of Pakistan's eastern wing, but lack of funds has held up its early development.

Another Project

The setting up of a radio-communications industry in India is provided for under an agreement just signed in New Delhi, between the Indian Ministry of Commerce and a French concern, the Compagnie Generale de T.S.F., we learn. The latter is to provide facilities for training Indian technicians, in addition to designing the layout of the factory and setting up the plant.

Victoria's Problems

The question of money available for public works is raised in the annual report of the State Electricity Commission of Victoria, which has just been placed before the Australian Parliament. Stressing that the matter is of concern to public authorities throughout Australia, the Commission asks for a solution on a national basis of the problem of what money is to be available for future works. Planning for large scale electricity and fuel projects must necessarily involve commitments over periods up to five or six years ahead, but there was no means of ensuring that sufficient funds would be available over this long period for uninterrupted manufacture and erection of plant. Charges directly due to the deferment of capital works because of insufficient loan funds during the year cost the Commission £442,000, which was met from current revenue. Despite this additional charge a revenue surplus of £209,210 is recorded, after making the usual provisions.

Transmission Line Contract

A new h.t. transmission line is to be built between Cairns and Innisfail, Queensland, at a cost of £355,500. The state Premier, Mr. Gair, has stated that the tender of Electric Power Transmission Pty., Ltd. (New South Wales) for the work of constructing this 45-mile line had been accepted by the Cairns Regional Electricity Board. This line will be the first section of the h.t. transmission line to be built between Tully Falls and Cairns, as part of the Tully Falls hydro-electric project. It is expected that tenders will be called soon for the section between Innisfail and Tully Falls. The Tully Falls scheme, estimated to cost an initial £8 million, is one of the State Government's major development projects. It is hoped that by 1955, electricity will be supplied from the scheme to the Cairns power network.

Work at Lake Echo

The Hydro-Electric Commission of Tasmania has started construction of the new Lake Echo power scheme, the Hydro-Electric Commissioner, Mr. Knight, has announced. An access road has been built to the dam site at the southern end of Lake Echo. Clearing of timber and the construction of the dam is to begin next month. Work has also been put in hand on the construction of a two-mile tunnel to carry water from the Dee River to Brady's Lake, Mr. Knight added.

Minerals for Batteries

Experiments at the Division of Industrial Chemistry have shown that both manganese dioxide and graphite for electric dry cell manufacture could be obtained from sources within Australia, it is revealed in a report from the Commonwealth Scientific and Industrial Research Organisation. Previously these materials have been imported, as the local minerals contained impurities rendering them unacceptable under overseas specifications. But Australian research on dry cell chemistry has now shown that objection to some impurities was based on tradition only and had no sound scientific foundation, it is added. Also, techniques have now been devised for the removal of impurities which are deleterious, and the Research organisation has recommended the local firms to use wholly Australian materials in battery manufacture.

Penang Report

An increase of 14·12% in units sold is recorded in the annual report of the Electricity Supply Department of the George Town Municipality, Penang, covering the year 1951. The total units sold amounted to 27 millions of which 7·7 millions were taken for private lighting alone. Commercial power accounted for a further 10·4 millions and domestic power for 3·8 millions. At the Department's Prai power station, nearly all the boiler plant had been converted to oil burning, and during the year 18,577 tons of fuel oil was consumed. Although the Department added 1,370 consumers to its total, the increase being chiefly for lighting, the installation of cookers and water heaters has been restricted because the power station cannot carry the additional load. The meter section, however, had a busy year, and of the 26,388 meters on circuit, 3,397 were overhauled and 4,983 tested and recalibrated. For the year's working the Department reports a revenue surplus of $265,309.

PERSONALITIES

IN THE INDUSTRY

The Metropolitan-Vickers Electrical Co., Ltd., announces that **Professor Willis Jackson,** D.Sc., D.Phil., M.I.E.E., has accepted the full-time appointment of director of research and education of that company as from July 1 next. The appointment carries with it a seat on the board of the company. Professor Jackson is Professor of Electrical Engineering at The Imperial College of Science and Technology of the University of London. He gained his early training with M.-V., and between 1936 and 1938 was a research engineer with the company. The present director of research and education, who succeeded Sir Arthur P. M. Fleming in that position, is **Dr. C. Dannatt.** Professor Jackson's appointment will release Dr. Dannatt for an extension of his present duties as assistant managing director.

Prof. Willis Jackson

Mrs. F. A. Thompson has been appointed a director of Lindley Thompson Transformer (Holdings), Ltd.

Having reached the age of 70, **Mr. E. L. Cadwallader** has decided to relinquish his executive appointment with C.A.V. Ltd., but retains his seat on the board, filling the role of consulting director. **Mr. Hubert G. Mason,** now appointed joint general manager, is the firm's director of sales and service, and a member of the board of Joseph Lucas (Export) Ltd.

Resigning his position as principal assistant (purchasing) to the South Eastern Electricity Board, **Mr. C. A. Carr,** Assoc.I.E.E., has become technical representative and agent for the South of England for E.M.P. Electric Co., Ltd. Mr. Carr, whose address is La Rocque, Cranleigh Avenue, Rottingdean, Sussex, also hopes to represent a number of other companies, we understand. Before joining the H.Q. staff of Seeboard on vesting day, he was for 17 years in the engineering and purchasing department at the head office of the County of London Electric Supply group. Earlier he had held appointments with I.C.I. Ltd. at Billingham-on-Tees, A. Reyrolle and the Sunderland Forge and Engineering Co.

Mr. C. A. Carr

The Ministry of Supply has announced that **Mr. A. G. E. Briggs,** who relinquished the post of deputy controller of supplies (Munitions Production) on January 1, to return to full-time duties as joint assistant managing director of Tube Investments Ltd. (Electrical Division), has consented to remain on the Royal Ordnance Factories Board of Management as an additional non-official member. Mr. Briggs, on whom the honour of Knight Bachelor was conferred in the recent Honours List, has served on the Board since it was created in April, 1952.

Sales manager of the industrial control department of Metropolitan-Vickers Electrical Co., Ltd., since January, 1948, **Mr. C. H. de Nordwall,** M.I.E.E., has been appointed the company's manager for South America. His successor as sales manager of the industrial control department is **Mr. G. D. Harradine,** Assoc.I.E.E. Mr. de Nordwall received his technical education at Faraday House and went to Metropolitan-Vickers as a college apprentice in 1922. After a period in Nigeria as chief engineer of Northern Nigeria (Banchi) Tin Mines, Ltd., he went to Russia in 1930 with M.-V. erection staff, and three years later transferred to the company's London office. There followed a short spell with E.D.A. as power development engineer, and from 1939 to 1945 he served in the Royal Engineers, attaining the rank of colonel. Afterwards, he was director, Electrical Industries Branch, in the Control Commission, Germany. In 1947 he returned to M.-V., joining the sales management staff, and in the following January he was appointed sales manager, industrial control department. Mr. de Nordwall was chairman of the M.-V. Overseas Association for 1950-51. Mr. Harradine joined the company as a draughtsman in industrial control department in 1927 and was transferred to the sales side a year later, becoming section leader, tenders, in 1933. In 1947 he was appointed chief correspondent, and in 1949 assistant to sales manager. He has been assistant sales manager, industrial control department, since August, 1951. Mr. Harradine is a Member of the Association of Mining Electrical and Mechanical Engineers.

Mr. C. H. de Nordwall

Mr. G. D. Harradine

Chosen as the new controller of the Merseyside and North Wales Division of the B.E.A. is **Mr. P. Briggs,** M.Inst.F., now chief generation engineer (operation) to the South Eastern Division. He succeeds **Mr. W. A. Gallon,** who, as we have already reported, is now deputy chairman of the South Wales Electricity Board. Mr. Briggs gained early training with Peter Brotherhood, Ltd., and in 1925 went to Islington power station as relief charge engineer, subsequently becoming charge engineer there. After a period as charge engineer at the old Fulham generating station, he was appointed assistant generating engineer at the new Fulham power station of the London Power Co. in 1936. In 1939 he became maintenance superintendent and in 1945 was appointed power station superintendent there, holding that position until taking up in 1948 the post which he is now relinquishing.

Mr. P. Briggs

Manager of the Manchester district office of the British Thomson-Houston Co., Ltd., for the past 22 years, **Mr. A. B. Race,** M.I.E.E., who has just retired, was with B.T.H. for over 40 years. He received early technical education at Durham University (Armstrong College) and served an apprenticeship with Clarke, Chapman and Co., later gaining further practical experience with that firm and with A. Reyrolle and Co. In 1912 he joined the B.T.H. Construction Dept., becoming superintendent for the London district, and then from 1916 until 1930 was with the commercial engineering department at the head office, Rugby. After a period as assistant manager of the Supply Dept., Rugby, he became manager of the Manchester district office in October, 1930. From January 1933 until his retirement he was also manager of the firm's Liverpool district office. On the occasion of a farewell luncheon recently, Mr. Race was presented with a number of gifts from the staff, and a cheque.

Mr. A. B. Race

Mr. F. Winstanley, the director of the General Electric Co., Ltd., responsible for the illuminating engineering, lighting fittings and household electrical appliances sales organisation, is sailing in the R.M.S. *Rangitoto* on January 23 for a business tour of the company's branches in New Zealand, Australia and Tasmania. He expects to spend three weeks in New Zealand before visiting Australia and will be away about four months.

To celebrate the fifty years' continuous service of one of its directors, **Mr. William S. Bulpitt,** the Birmingham firm of Bulpitt and Sons, Ltd., last week held a dinner and dance at the Grand Hotel which more than 300 long-service employees and members of the firm attended. Of the directors, **Mr. Walter H. Bulpitt,** O.B.E., J.P., who is 74 years of age, boasts 59 years' service and **Mr. Albert E. N. Bulpitt,** 72 years of age, 57 years, in the firm which was founded by their father in 1868. At last week's ceremony Mr. William S. Bulpitt was presented with a grandmother clock from the employees and staff, and eight members of the firm with 25 years' service each received a gold watch.

Mr. W. S. Bulpitt

Mr. R. D. V. Roberts, B.Com., has been appointed deputy director of welfare of the British Electricity Authority but will, at the same time, continue his present duties as secretary of the National Joint Advisory Council. Before entering the Authority's service, Mr. Roberts was deputy chief districts' officer to the Miners' Welfare Commission, and previously district miners' welfare officer in the Northumberland and Cumberland coalfields.

Dr. Walter Cawood is to be principal director of Scientific Research (Defence) at the Ministry of Supply, it has been announced. He succeeds **Dr. Owen H. Wansbrough-Jones,** who takes the place of Sir Harry Garner as chief scientist at the Ministry. Dr. Cawood has been deputy director at the Royal Aircraft Establishment, Farnborough, Hants, since 1947.

Mr. P. F. Deakin and **Mr. F. W. Main** have retired from the board of Enfield Cables, Ltd. Mr. Deakin was the company's works director from 1943 until 1951, when he retired from active work owing to ill health, but remained on the board as a part-time member.

Mr. A. T. Poustie, B.Sc., Dip.E., has been appointed design engineer, distribution Metropolitan branch, to the State Electricity Commission of Victoria, Australia. He has been with the Commission since 1934 and was earlier on the staff of the Melbourne Electric Supply Co. The Commission also announces that **Mr. I. B. Montgomery,** B.A., B.E.E., A.M.I.E.(Austr.), has been appointed distribution superintendent of the Bendigo branch.

We were extremely pleased to hear last weekend that **Mr. H. Nimmo,** chairman of the Southern Electricity Board, has now left hospital and has returned home to convalesce. In view of the earlier reverse, to which we have referred, his many friends will rejoice at this good news, and join with us in hoping that his restoration to full health will quickly become complete.

Mr. W. Revell, who is well known in the cable and radio industries, has taken over the duties of London sales manager of Aerialite, Ltd., and is operating from their London depot at 20/22 Craven Road, Paddington. **Mr. I. G. Harrison** will be looking after the company's Scottish interests from the depot to be opened in Glasgow.

From February 1 next, the Electrical Power Engineering Co. (B'ham) Ltd., is making a change in its arrangements for London and the Home Counties, consequent upon the decision of **Mr. A. N. D. Kerr,** A.M.I.E.E., to return to the field of standard industrial a.c. motors, as distinct from the more specialised range of a.c. and d.c. motors and generators made by the E.P.E. Co. In his place, the latter company has appointed **Mr. W. A. Biggs,** A.M.I.E.E., as their London manager. He served an apprenticeship at the Witton Works of the General Electric Co., Ltd., and has subsequently had a wide experience in sales and service of motors and control gears.

Mr. A. A. Gray, C.A., principal assistant (internal audit) in the chief accountant's department of the South West Scotland Electricity Board, has been appointed accountant in the Dumfries and Galloway sub-area of the Board.

Mr. T. Arthur Davies, deputy assistant engineer at Cwm Dyli hydro-electric power station, Merseyside and North Wales Division of the B.E.A., has been appointed assistant hydro-electric engineer for North Wales and will be stationed at Llandudno Junction.

Director of the Research Laboratories of the General Electric Co., Ltd., **Mr. O. W. Humphreys,** B.SC., M.I.E.E., F.Inst.P., is sailing in the *Strathmore* for a business tour of Australia. His itinerary includes a visit to the company's electronic-controlled-rocket laboratories on the Woomera range, and during the course of his tour he will lecture in Sydney to a joint meeting of the Institute of Engineers (Australia) and the I.E.E. (London). He will also lecture in Sydney to the Illuminating Engineering Society and in addition address various engineering societies and institutes at Wollongong, Port Kemble, Hobart and Melbourne.

OBITUARY

Lt.-Col. Sydney Smith, chairman of J. Blakeborough and Sons, Ltd., and joint managing director of British Ropes Ltd., died on January 4, aged 52. He had also been a director of the Yorkshire Electric Power Co.

Mr. C. J. (Chris) Page, principal of the Cardiff electrical contracting firm of Page and Stibbs, died on January 15, aged 67.

We learn with regret of the death within two days of each other, of **Mr. Edgar Croft** and **Mr. Armistead Smith,** who founded the Bradford electrical engineering and contracting concern of Smith and Croft in September, 1900. Mr. Croft died on January 9, aged 83, and Mr. Smith on January 11, aged 81. Both were in the employ of the firm of G. A. Steinthal's, of Bradford (now Jessop and Boydell, Ltd.), before commencing in business on their own account. Mr. Croft ceased to take any active participation in the business about 14 years ago, but was a shareholder in the limited company which was formed in 1949. Mr. Smith had been a vice-president of the Electrical Contractors' Association, also a member of the Council. For over 20 years he had been secretary of the Bradford branch of the Association of which he was also chairman for several years.

Mr. J. Morton, M.I. Mech.E., M.I.E.E., who was chief engineer to the West Midlands Joint Electricity Authority from 1938 until retiring in 1942, died on January 14, aged 75.

Mr. H. Sayce, chief lamp salesman at the Birmingham office of the British Thomson-Houston Co., Ltd., died recently, aged 58. He joined the company as a lamp salesman in November, 1933, since when he had become a popular member of the trade in that area. His death will be regretted by his colleagues and many business friends.

Mr. H. Sayce

Capt. H. Leslie Dixon, M.I.E.E., A.M.I.Mech.E., who died on January 12, aged 79, had a varied and colourful career in the electrical industry. Apprenticed with J. G. Statter and Co., Ltd., he gained further experience before joining the National Electric Supply Co. at Preston as mains superintendent. After a spell as electrical engineer to Manlove, Alliott and Co., he became assistant to the electrical engineer and inspector to the Corporation of London, and then from 1906 to 1919, apart from the war period, was chief engineer and manager of Leatherhead and District Electricity Co. After the war, in which he served in the R.F.C., he founded Leslie Dixon and Co. in 1919, specialising in the disposal of ex-Government electrical stores, and he was one of the pioneers of the radio trade.

Dr. Hans Carsten, Dr.Eng., M.I.E.E., F.Inst.P., who had been consultant telecommunications engineer of British Insulated Callender's Cable Ltd. for eleven years, died recently. Dr. Carsten was widely known in international circles for his work on telecommunications and cable measurement techniques. He received technical training at Danzig University. After a short period in the Telegraph Research Station of the German Post Office he joined the Central Laboratory of Siemens and Halske in 1922 and eight years later was transferred to the Transmission Cables Sales Department. He left Germany before the war and joined B.I.C.C. in 1941.

Standard for CIRCUIT-BREAKERS

Important changes in New Edition of B.S.116

IMPORTANT modifications are apparent in the new edition of B.S.116, now entitled "Oil Circuit-Breakers for Alternating Current Systems." The standard is now issued in one part instead of two, and no longer includes provision for oil switches and oil isolating switches. While it is still based on the appropriate publication (No. 56) of the International Electrotechnical Commission, it has been altered in some details in the light of additional experience since 1937.

Two groups of c.b's are recognised: those having three-phase breaking capacities of up to 500 MVA (Group A), and those of higher breaking capacity (Group B). The main part of the standard begins with a section on rating, and here it is notable that the short-time current rating is now to be given for one or three seconds, and not one or five, as before. It is now stated that the three-second rating applies when the ratio, rated symmetrical breaking current/rated normal current, is equal to or less than 40, and the one-second rating when it is greater.

Ratings

Two new tables replace the previously published "standard rating" tables, the first of these dealing with "preferred" values, which are recommended in order that the economic advantages of standardisation may be most strongly realised. (See page 170.) 275 kV breakers of up to 7,500 MVA breaking capacity, 1,200 amps normal current, are included in the standard—not preferred—table.

Changes in regard to circuit-breaker auxiliary gear include the natural one of substituting 240 V for 230 V a.c. as one of the standard supply voltages. There are also some changes in the requirements for power closing device and trip-coil operation on abnormal voltages.

A new section of the standard deals with service conditions. This summarises material contained in appendices of the earlier edition, and adds notes on the earth arrangement of circuits which c.b.s complying with the standard may be expected to protect. These include solid or resistance earthing, in connection with which a definition of effective earthing is added—"A three-phase system is considered to be effectively earthed if, during phase-earth faults, the voltage to earth of the sound phase does not exceed 80% of the voltage between lines of the system."

The earthing methods covered are: all neutrals insulated; single-phase with one line earthed; and earthing through arc suppression coils. For the latter case three methods of system operation under fault conditions are listed: automatic disconnection after a short delay, non-automatic disconnection, with a total maintained fault time of 125 hours/year or eight hours in one day; and longer operation, though not approaching continuous operation, with one phase earthed. For this last condition, and for circuits having permanently insulated neutrals, selection of special switchgear is recommended.

Another new section is entitled "Operation in Service," and this is once again largely a collection of clauses previously spread throughout the standard. Some changes are, however, apparent in the tables of clearances for indoor and outdoor circuit-breakers. The most significant results from the abandoning of a fixed dimension for clearance in outdoor c.b.s of 22 kV and above, and reliance instead on impulse-voltage tests to prove the effectiveness of the design clearance. Another new clause in this section lays down minimum creepage distances for outdoor insulators, with separate values for normal and heavy pollution.

Type Tests

As suggested above, the principal change in the proving tests to be applied to c.b.s. under the new specification relates to an impulse-voltage test. This is applied with a 1/50 wave, between each pole and earth in turn, with the breaker closed, and between all terminals on one side of the c.b., and all the others earthed, with the breaker open. Five consecutive impulse-voltage waves are to be applied, and neither insulation puncture nor air flashover must occur. Peak values of the impulse wave range from 150 kV for 22 kV breakers to

1,050 kV for 275 kV designs.

Other changes in the type tests are mainly concerned with relatively minor details, and much the same may be said of the routine tests. One more notable change in this latter section, however, is the differentiation of the power frequency h.v. test on breakers of 110 kV and above, according to the earthing of the system in which the circuit-breaker is to work.

General

As stated at the beginning of this review, the new standard shows relatively few fundamental changes, but the opportunity has been taken of bringing it up to date, and of generally tidying-up its arrangement. There seems rather less specification of mechanical details, while on the other hand there is increased concern with the special requirements of the neutral earthing circuit-breaker.

Eleven appendices are provided, and these include a new version of the valuable guide to the calculation of short-circuit currents and the selection of standard o.c.-b.s.

TABLE I. PREFERRED VOLTAGES AND RATINGS FOR O.C.B.S

Service Voltage kV	Breaking Capacity MVA	Normal Current amp
0·415	26	600, 800, 1,200, 1,600
3·3	50	400
	75	400, 800
	150	800, 1,200
6·6	150	400, 800
	250	800, 1,200
11	150	400, 800
	250	400, 800
	500	800, 1,200
33	500	400, 800
	750	400, 800, 1,200
	1,500	800, 1,200
66	1,500	800
	2,500	800, 1,200
132	2,500	600
	3,500	800

ELECTRICAL NORWAY

IN the use of electricity in the home, Norway shows a degree of enterprise far greater than that in this country, despite the severe excess of demand over supply. That is one of the conclusions to be drawn from the 8th Caroline Haslett Trust lecture given by Miss M. B. Marris at the I.E.E. on Monday. Miss Marris, who is with the South Wales Electricity Board, spent a considerable time last year visiting Norway's Electricity Supply Industry, and in addition was able to inspect typical domestic and commercial installations.

Norway has over 2,000 generating stations which, in 1951, had a total installed capacity of 3,400 MW. During that year some 17,500 million kWh were generated; approximately 5,300 units per inhabitant. Yet despite this high figure, the present rate of development in the country is too excessive for the electricity supply to meet all demands. One reason for this is the difficulty of supplying load areas from distant stations as it is well-nigh impossible to provide any national grid system over the mountainous and fjordal terrain.

Electricity Rationing

In view of the serious shortage of energy, a form of rationing is imposed for the domestic use of electricity, there being three methods depending upon the total consumption. The net effect is that both housewives and contractors are "electricity minded," constantly seeking to use energy as efficiently as possible. Supply authorities are themselves not contractors nor do they sell appliances, although installation inspectors are employed to ensure appliances are correctly installed.

Except for cookers, earthing is not used, all plug-tops being of the two-pin type, rated at 6, 10 or 25 amps. Various types of cookers are available, somewhat different from British makes, in that oven elements are above and below the cooking space.

The most important feature of household domestic appliances is the extensive use of three position switches, even for both cooker elements. This has enabled the Norwegian housewife to run her water and space heater continuously, and use other appliances at the same time, whilst keeping the total demand within reasonable limits. One quarter of all domestic space heating is electrical, although most users show a preference for panel or skirting type heaters, many being of low consumption and left on continuously. Many washing machines are in use, a communal type for use in flats having a capacity of 20 lb. and rated at 8 kW. Most households are equipped also with water heaters, although these generally have a lower rating, 1 kW for 20 gallons. Many such installations incorporated an oil burner which was brought into operation for heating water should the total demand exceed the limit. For an all-electric house, the total consumption would be from 18,000 to 25,000 units per year.

A national organisation, the Material Control department, inspects every appliance before it may be marketed. Safety, insulation and overheating are checked but not performance.

The BUYER'S *Column*

Chilton Shaving Innovations

TO greet the arrival of Coronation Year and the host of overseas visitors who will soon be here, CHILTON ELECTRIC PRODUCTS LTD. Hungerford, Berkshire, have produced a revised model of their Kub shaver and have completely redesigned their shaver socket.

The Kub shaver is now fitted with a variable voltage control, situated near the shaver head, as was formerly only available on the more expensive Buk razor, which now permits accurate tuning on any voltage between 180 to 250 V a.c. In addition, Kub shavers will now be available in two-colour schemes with either red or grey flaps and side lines. Price, however, still remains at 4 guineas.

The company's shaver socket provides a convenient means of operating electric shavers of British, Continental and American design from one outlet without the need for several different adaptors and resistances.

The outlets are for standard British 5 amp 2-pin plugs at 230 V, Continental 6 amp 2-pin plugs at 230, 165 and 110 V, and American flat 2-pin plugs at 110 V.

They are designed for shavers and appliances not rated at more than 20 W. An auto-transformer is incorporated, which is protected by a standard type glass cartridge fuse, that can be switched off when the socket is not in use.

These sockets will be marketed in three different models. Type No. 1 for mains supplies 200-250 V a.c., No. 2 for mains supplies 165 V a.c. (Italy only), No. 3 for mains supplies 100-120 V for Canada, U.S.A. and the European continent.

Earth Continuity Ensured

THE "Portaway" system of earthing, which is produced by PORTER ELECTRICAL PRODUCTS LTD., 11 King's Road, Bramhope, Leeds, was described in our issue of December 25, 1952.

In the last paragraph of the note unfortunate literal errors made the descriptions of the accessories incorrect. For tee-off connections, terminations and intermittent bonding, the firm recommend their Fulgrip bonding clamps. These are made in four sizes: TOC1-3 for conductors sizes 0·015 to 0·03 sq ins, 0·03 to 0·06 sq ins., 0·06 to 0·10 sq ins. and TOC-4 for conductor sizes ·10 to ·10 sq ins. The TOR range of clamps for use with "Dyrod" earth electrodes is made in two sizes, each covering two conductor sizes.

The TIC range of clamps is recommended for machinery, bedplate, girders and the like, and is available also in four sizes. Where it is desired to terminate one conductor only at the Portaway Dyrod earth electrode this standard TIC range is suitable in conjunction with the CTR clamp made in two sizes.

The "Wynn" Dishwashing Machine

ONE thousand pieces per hour is the capacity claimed for a new stainless steel dishwashing machine called the "Wynn," which is being made by ATACK-TURNER LTD., of Chapel St., Manchester 1.

Due to be launched at the forthcoming Hotel and Catering Exhibition, the machine is simple and economical to operate. Compact in size, 28 in. square by 40 in. deep, the Wynn dishwasher washes, rinses and dries in one operation. It appears to be an ideal machine for the smaller restaurant and snack-bar.

Washing water is heated in the machine by 2 kW immersion heaters, thermostatically controlled for washing at 150° F and for rinsing at 190° F. Water enters the machine's tanks at the base, which are provided with overflows connected to waste outlet.

Crockery is placed in baskets resting above the cast aluminium impellor which revolves, the centrifugal pump sending water through jet orifices on to the crockery. The operation takes one minute. The control knob is then moved to the rinse tank and after one minute the motor is switched off and the crockery is clean and dry. Removable scrap and filter trays are provided.

These dishwashing machines cost £190 each ex works, there being no purchase tax, and the makers give a 6 months guarantee.

Falks have a Featherweight

JOINING the growing ranks of those who believe that it is heat and not weight which is important in that thankless task known to all housewives—ironing, FALK STADELMANN AND CO. LTD. 91 Farringdon Rd., London E.C.1, have now marketed their new "Featherweight" iron.

This attractive model weighs only 3 lb. against the common 5 lb and is said to be ready for use within one minute of switching on. In addition to

Falks "Featherweight" weighs only 3 lbs

D

these advantages it has an alloy soleplate which has no plating to peel off or wear away and which has a button groove at the top.

The iron is equipped with a thermostatic heat selector switch for different fabrics; is fitted with 7 ft of 3-core cable and is for voltage ranges 100/120 V; 200/230 V; 230/250 V a.c. supplies. Finished in cream enamel the "Featherweight" iron retails at £2 2s. or in chromium finish at £2 5s.

Consider These Decorations!

MADE by W. J. SAVILLE AND CO., LTD., well-known suppliers of display materials, Savko House, Eagle Wharf Road, London N.1, is a range of translucent plastic coloured Coronation plaques.

These interesting display panels are made from a special semi-rigid plastic material which combines the many advantages noted hereafter.

The panels are extremely light in weight; the panel illustrated, although its dimensions are 22 in. x 16 in., weighs approximately 2¼ oz. Made from material which will stand rough usage, they are claimed to be twice as strong as steel of its weight. They are thoroughly weather- and waterproof, being designed at the outset for exterior use although equally suitable indoors. They do not support combustion and have passed the L.C.C. fire test, and are available in brilliant waterproof colourings chosen by P. V. Collings, Esq., Heraldic Painter to His Late Majesty King George VI, or plain white for colouring according to preference.

There are twelve emblems in the range which are available in various sizes, all of which look most attractive when illuminated from behind with a low wattage lamp.

These Saville plaques will stand up very well to all weather conditions; in fact the test plaques which we were able to inspect at the company's works retained their colours in full brilliance even after exposure to the rigours of the atmosphere of London's industrial centre some six months. Mere hosing down removed the soot and grime, to reveal the clean whiteness of the material.

Prices are low, ranging from 2s. 3d. for a full coloured 6½-in. square Royal Crown to £2 17s. for the impressive 36 in. x 42 in. Royal Coat of Arms.

The centre of this colourful panel was executed by T. Humphrey Paget, O.B.E., engaged in the design of the present coinage

TRADE PUBLICATIONS

BOILERS.—Entitled "Yarrow Land Boilers" because the firm is equally renowned for their sea going boiler units, a beautifully produced brochure, published by Yarrow and Co., Ltd., Scotstoun, Glasgow W.4, surveys with the aid of adequate illustrations and blue prints the range of water-tube boilers for use in generating stations and industrial plants together with associated super-heaters, economisers, mechanical stokers, etc.

HEATING UNITS.—Now being received by retailers are copies of a new two-colour brochure, dealing with Thermovent and Thermotube electric space-heaters and a smaller Thermovent leaflet also in two-colour. Both of these issued by E. K. Cole, Ltd., Southend-on-Sea, have illustrated covers.

REFRACTORIES.—A well produced brochure issued by Leeds Fireclay Co. Ltd., Wortley, Leeds, 12, surveys the uses of the many refractories products of the company and gives useful tabulated technical information.

INSTALLATION SUPPLIES.—Conduit fittings, Egatube conduiting switchgear and control gear, lighting fittings and handlamps are all listed in the comprehensive price lists issued by Ega Electric Ltd., Holyhead Road, Wednesbury, Staffs.

CAPACITORS.—Capacitors and condensers are featured in the 2nd edition of B/C 13, a general guide issued by Standard Telephones and Cables, Ltd., Connaught House, Aldwych, W.C.2.

ACCESSORIES.—The range of accessories illustrated in a brochure issued by New Day Electrical Accessories, Ltd., 136-8 Mary St., Balsall Heath, Birmingham 12, are said by the makers to be a new departure in accessories technique.

ADHESIVES.—Leading article in a recent issue of Aero Research Ltd., Duxford, Cambridge, Technical Notes concerns the use of adhesives in the electrical industry.

LIGHTING.—A new specification folder, featuring Commercial lighting units (Publication No. L 1953), has been issued by Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham.

FURNACES AND OVENS.—Details of the wide range of electric furnace and drying equipment is produced by Sturdy Engineering, Ltd., Cumbria House, 85 Goldthorn Hill, Wolverhampton, are set out in a recently issued leaflet (No. 10).

GAS ANALYSIS.—Designed for the complete quantative analysis of town gas supplies, the G.L.C. (Gooderham) soap film gas analysis apparatus marketed by Griffin and Tatlock, Ltd., Kemble St., Kingsway, W.C.2, incorporated Simmerstat-controlled electric furnaces. Details of the apparatus are contained in a leaflet available from the firm.

WELDING.—A new technical circular (No. 878), has been prepared describing the characteristics and applications of the "Weldeep" electrodes produced by the Quasi-Arc Co., Ltd., Bilston, Staffs.

MOTOR CAR LAMPS.—Entitled "Seeing with Safety," the new booklet produced by Joseph Lucas, Ltd. of Birmingham first surveys generally the progress in lighting equipment over the past years and then more particularly that facet with which the company is closely connected—automobile lighting.

LIGHTING.—A broadsheet issued by Ekco-Ensign Electric Ltd., Essex Street, Strand, W.C.2, depicts the range of industrial fluorescent lighting fittings which bear the company's name.

FLOODLIGHTING EQUIPMENT.—A folder issued by Revo Electric Co., Ltd., Tipton, Staffs, illustrates the use of their equipment in floodlighting football fields and sports grounds.

SERVICE COUNTERS.—Self Service counters are one side of the manufacturing capacity of John Kelly and Sons (Kitchen Engineers) Ltd., who were recently featured in these pages as makers of the "Visidial" deep fat fryer. These are described in a leaflet issued by the company.

RADAR.—A booklet describing the Harbour Communication system at Liverpool has been issued by Automatic Telephone and Electric Co., Ltd., Strowger House, Arundel Street, London, W.C.2, who were largely concerned with the installation.

A New Range of Fittings *by* Smart & Brown

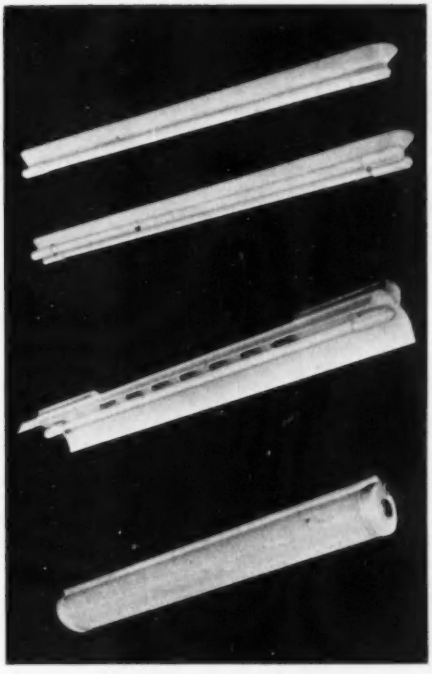
AMONGST new fittings which have recently become available from Smart and Brown, (Engineers) Ltd., Trading Estate, Spennymoor, Co. Durham, are the models which we illustrate.

The SF 15 and TF 25 5 ft "Maxilite" industrial fittings are extensions of the 2 ft and 4 ft "Maxilite" range. The chassis is the familiar "V" section "Maxilite" channel in steel. All control gear is contained within the chassis and the fitting uses either the normal b.c. holders or with the "Hi-craft" spring-loaded b.c. holder which incorporates its own lamp-end covers. Fittings are available finished overall in a high-gloss white enamel or in vellum.

The OST fitting is a 5 ft open-ended trough fitting permitting some upward light which has separately detachable wing reflectors which can be easily removed without interfering with lamps, control gear or suspensions. Finish is white high-gloss stoved enamel.

PB fittings comprise an opal Perspex reflector with ¼ in. wide reeds formed into the shape of an oval and mounted in special end plates on standard "Maxilite" fittings.

The 2 ft and 4 ft diffuser are available either separately to modify an existing fitting or complete with a fitting. The 5 ft type is supplied only complete. Finish is either glossy cream or cream wrinkle.



(Top) Models SF 15 and TF 25 have clean pleasing lines, whilst the OST 15 has slots in its reflector to permit upward lighting. The PB 24 (bottom), in a perspex shade, is suitable for domestic use

The WEEK in NEWS

London Board Decides on Major Reorganisation

Evolution towards a Two-Tier Structure

A CHANGEOVER from three-tier to two-tier organisation—eliminating sub-area organisations—is to be undertaken by the London Electricity Board. It is not proposed to change the whole organisation forthwith, but to commence, from April 1 next, with the South Western sub-area and possibly follow on with the North Western. The South Western sub-area, which until now has had five districts, will be divided into two districts: (1) Battersea and Wandsworth (including Barnes), and (2) Mitcham and Wimbledon, which will include Malden and Coombe, and Merton and Morden. Each of these new districts will be under the direction of a district manager directly responsible to the Board's headquarters.

The aim is to house in one building the technical, commercial and administrative staff in each district, except as may be necessary for supervising employees at local depots. The Board's accountancy work is already functioning, in the main, on a two-tier basis.

This major reorganisation will bring some degree of overstaffing, which it is proposed to deal with by the normal process of retirement. The Board aims at causing the minimum amount of inconvenience.

The L.E.B. has for some time been concerned that its working costs are much higher than those of the other Electricity Boards. This change, which follows an extensive investigation carried out by a small Working Party should result in economy and increased efficiency.

Instrument Shows in America This Year and Next

THE largest display of instruments ever held, is the claim made by the organisers of the eighth National Instrument Exhibit which is to take place at the Sherman Hotel in Chicago next September. This exhibition was first held in 1946. Attendance at the eighth show is expected to be 15,000. Immediately after last year's event, space reservation forms were despatched and 30,000 sq ft of space booked. An additional 4,000 sq ft was negotiated and three-quarters of this has now been sold. Exhibit manager is Richard Rimbach, 921 Ridge Ave., Pittsburgh 12.

At the same time arrangements are being made for the first International Instrument Congress and Exhibition which is to take place at the Philadelphia Museum and Convenvention Hall between September 13 and 25, 1954. Invitations are to be extended to all instrument users throughout the world. Space rate will be $3·50 per sq ft.

Special Rates for Night Use of Power

AN offer of cheaper electricity at night has been made by the South Western Electricity Board to industrial and commercial consumers. Officials of the South Western Board announced the plan in Plymouth last week, where large works and offices, especially those in the course of construction, will be encouraged to install modern thermal storage plant.

The scheme represents an effort to make the most use of new generating plant installed during 1952. It is being pointed out that thermal storage plant, combined with efficiency of generating plant running at night when older plant is shut down, will help to gain the best use of the country's coal and power-plant resources.

It is understood that the price of electricity used between 10 p.m. and 7 a.m. will range from 0·5d. to 0·375d. a unit, according to consumption. There is to be an additional sum to cover the increased cost of coal. A slightly increased price will apply to 12 hours' use between 7 p.m. and 7 a.m. There will also be other concessionary rates for combined day and night use.

The First Half-Century

One good piece of work initiated by the Manchester section of the National Electrical Contractors' Association and adopted by the Northern Section, is the issue of workmen's cards, on which employers inscribe in code the record of the individual. Such a system, if properly carried out, should go far to eliminate the bad workmen, and to raise the efficiency of the others. But the system must come into general use to be thoroughly effective. It is, therefore, much to be hoped that the National Association will recommend the system for general adoption.—*From our issue of January* 22, 1903.

Commonwealth Development Plans

Much Responsibility rests with Electrical Industry

BROAD plans were laid at the Commonwealth Economic Conference last month for a determined effort to develop the Commonwealth countries especially as regards food production and mineral extraction. Some details of intentions have been enumerated this week by the Treasury, which places particular importance on Britain's ability to provide adequate capital goods sufficiently quickly. Much of this development programme depends largely on the expansion of electricity services, and every country concerned looks to U.K. manufacturers for the supply of relevent machinery. This country is therefore being asked to increase exports of capital goods to sterling countries as well as win a surplus in dollar lands. It may well be that recent relief from defence work in the engineering industries precluded these plans, but there has been no indication as yet regarding the priority to be given to Commonwealth exports.

A fair proportion of the burden of this development programme will undoubtedly fall on the electrical manufacturing industry, whether the goods be required for power projects or otherwise. In fact it is stated that in many countries industrial expansion is held up by lack of transport and power. Notable examples of items which cannot be obtained quickly enough are locomotives, heavy electrical plant and agricultural machinery.

Among the projects which will assist plans greatly are those of the Volta River on the Gold Coast, and Owen Falls in Uganda. Others vital to success are in Australia, where demand is growing annually by 10%; in South Africa, where eight major projects have been initiated; and in India and Pakistan, where many new irrigation schemes depend to a large extent on planned electrical development.

Reminder on H.P.

A REMINDER about the implications of the Hire Purchase and Credit Sales Agreement (Control) Order, 1952, has been issued by the Board of Trade. The notice points out that short term credit sales in which repayment periods are for less than nine months, are exempted from the Order and the seller is not obliged to charge the initial deposit of 33⅓%. That exemption does not apply to H.P. agreements where the initial 33⅓% deposit must be paid whatever the length of the period of repayment might be.

Higher Education

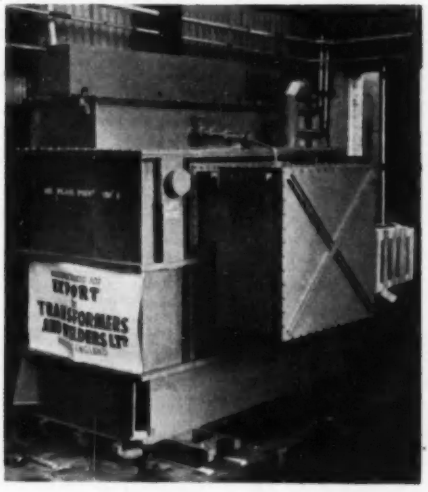
THE fourth annual report, for the year 1951-52, of the London and Home Counties Advisory Council for Higher Technological Education has just been published. Among other matters, it is stated that the advanced courses for electrical technicians, on the lines of proposals reported in the previous report, and based on two or three years study of general electrical engineering, are not yet being offered. Discussions have taken place with B.E.A.M.A. but that body is not yet convinced of the need for new measures.

E.P.E.A. OBJECTS

FOR the first time since the B.E.A. was set up we carry this week a notice of the Electrical Power Engineers' Association advising members not to apply for certain positions at Littlebrook power station, which have recently been advertised. We gather that a difference of opinion has arisen between the South Eastern Divisional Controller and the E.P.E.A. over the correct procedure to be adopted in the proposed reclassification of the station as the new generating plant is put into operation.

New B.S.I. Offices

THE British Standards Institution is to move into new offices at 2 Park Street, Mayfair, at the end of next summer, it was announced last week. The present accommodation at 28 Victoria St., and 24 Gillingham St., are to be vacated, and although the floor area of the new premises is no greater, the obvious advantage will be the amalgamation of all activities under the same roof. Space at the new "British Standards House," as the Park St. offices will be called, will also be available for all the 3,800 committee meetings which the Institution convenes during a year.



A new 6,000 kVA, 30 kV o.f.w. arc furnace transformer made by Transformers (Watford) Ltd., and shipped recently to Sweden. It is designed for secondary current of 26,500 A and fitted with combined Delta/Star changeover and tapping switch on h.v. windings to give ten low voltages from 165 v to 64 v.

Part of a comprehensive display of coronation decorative fittings and emblems being staged by the S.E. Scotland Electricity Board in Edinburgh. Besides the display of badges, shields and plaques, new red, white and blue fluorescent lamps are used to good effect. Strip lighting, floodlights and methods of illuminating gardens and window boxes are also well to the fore. The majority of leading manufacturers of this type of equipment are participating. The display closes tomorrow (Friday)

TV Sales Up— Radio Sales Down

STIMULATED no doubt by approaching mid-winter and next year's coronation ceremonies, sales of television sets during November showed an increase over the previous month, and recorded the highest figure since December, 1951. In the same month, however, radio sales fell, the average number of sets sold per shop in November being 7·53 compared with 8·03 in October and 9·17 in November, 1951. Television sets sold during November averaged 12·95, a rise of 0·63 over October and compared with 14·26 in the same month in 1951. These figures are the latest issued by the R.T.R.A.

New Cleaners for Old

A COMPETITION is due to open on Monday in York which is designed to bring to light a veteran vacuum cleaner. A local electrical dealer plans to give away a new cleaner to the owner of the oldest model in or around the city. The old cleaner must be in working order. There will also be prizes for runners-up. The sponsors are A. E. Challenger and Co.

OFFICIAL PUBLICATIONS

N.C.B. SPECIFICATIONS

Flameproof Air-break Electrically Operated Gate-end Box, Size 1 and Size 2; Flameproof Air-break Circuit-breaker; Air-cooled Flameproof Single-phase Lighting Transformer Gate-end Box for M.T. Supply; Flameproof Air-break Electrically Operated 50 c/s Drill Gate-end Box; same of 150 c/s Drill Gate-end Box; and High Tensile Electrically Welded Steel Conveyor Chain. All seven each priced at 1s.

ATOMIC ENERGY RESEARCH ESTAB. REPORTS

EL/M 49: Argon Arc-welding of Aluminium, 2s.; G/R 751: Simple Inverting Transformer for Millimicrosecond Pulses, 3s. 6d. Both from H.M.S.O.

Paris Congress on Electric Heating

THOSE in this country concerned with Process Heating will probably be interested to know of the third International Congress on Electro-Heating which is to be held in Paris next May. This congress, like its predecessors, will consider the advances made in all forms of electrical process heating in Europe. It will be held under the auspices of the Comité Francais d'Electrothermie.

Further details from the Secretary, at 2 Rue Henri-Rochefort, Paris (17e).

LIGHTING NEWS

Coronation Ideas

LAST week (page 117) we reported on an exhibition being staged at the Lighting Service Bureau in London of simple ideas within everyone's reach, for decorative features in preparation for the Coronation. It was suggested at the opening that the display should remain open later than usual on some evenings to enable those who cannot visit the Bureau by day, to see the exhibition. As a result, arrangements have been made to keep the collection on view on two evenings when the Bureau will close at 9 p.m. instead of the customary 5.30 p.m. Those evenings will be on February 2 and 3.

Light and Colour

HAVING mentioned the Coronation, another aid to planners of decorations may well be E.L.M.A.'s new edition of their Technical Supplement No. 3. "Light and Colour." This pamphlet reviews the existence and application of colour in lighting installations, although it by no means refers to the forthcoming festivities—rather the reverse in fact, as it deals primarily with the factory and the home.

Course Repeated

IT may be remembered that due to the overbooking of the autumn Design Course at the Lighting Service Bureau, it was planned to repeat the lectures in the new year. This has now been organised and they will be held on successive Monday evenings beginning on February 16. Subjects to be dealt with are Electric Lamps and Circuits, Floodlighting, Shops, Industry, Offices, Lighting Design, and Homes.

COLD HOMES

TENANTS on a Dagenham, Essex, estate are complaining because the district heating system is not keeping their houses at the guaranteed temperature. The residents are paying 11s. a week for the central heating, but many have had to buy electric fires to keep their homes warm.

Plan to pay H.P. Deposits by Instalments

E. K. COLE INAUGURATE PRE-CORONATION IDEA

EKCO dealers are being invited to take part in a scheme whereby customers can pay the initial deposit on a radio or television set by instalments. The hire purchase restrictions imposed some months ago, required persons to pay an initial deposit of a third of the total cost of the receiver. The intention was, of course, to decrease spending, and has succeeded because of the difficulty many people find in depositing even a third of the total amount. The new scheme put forward by E. K. Cole, Ltd., does not seek the one initial lump sum.

The procedure is, briefly, that a prospective client undertakes to pay the deposit of 33⅓% in easy stages. When the deposit has been paid, the appliance is installed and the customer then enters into an ordinary hire purchase agreement to pay off the remainder of the cost of the set. This plan is being carried out with the help of Bowmaker, Ltd., who handle Ekco H.P. arrangements.

This enterprising venture has been prompted by radio and T.V. attractions, notably the Coronation, which are promised throughout 1953. An agreement entered into now will enable a T.V. receiver to be installed in time for the Coronation. The extra sales opportunities provided by the scheme, therefore appear to be considerable.

LONG BRACKETS TO COUNTER TALL TREES

TALL trees lining a busy road often present a formidable problem to street lighting engineers. An example of this difficulty was found in Wergs Rd., Tettenhall, when Revo Electric Co., Ltd. were asked to install a new scheme there recently. Despite the natural obstruction, a system was found to give entirely satisfactory results. The answer was to use tubular steel standards with brackets of 12 to 20 ft projection taking the lanterns over the centre of the roadway Fifty-nine of these standards were erected, each carrying a Revo C.13660 cut-out fitting for use with 140 W' sodium discharge lamps. The installation was carried out by the company's street lighting department, directed by Mr. J. W. Mason, surveyor for the Urban Council of Tettenhall.

E.I.B.A. Ball

THE Birmingham branch of E.I.B.A. have announced that their annual ball will take place on February 13 at the Tube Investments Social Club, Oldbury. Applications for tickets, which are priced at 10s. each, should be made to Mr. L. Wall, hon. secretary, Electrical Components Ltd., 102 Snow Hill, Birmingham 4.

ONE ELECTRICITY AUTHORITY WANTED FOR WALES

IN a letter to local councils, the Association of Welsh Local Authorities has recently sought support for a proposal to establish a separate administration in Wales for the generation and distribution of electricity. This letter has been considered at a number of meetings in the last week or so.

Carmarthen Rural Council has deferred consideration to a subcommittee for detailed examination. It was stated that South Wales already had its own Board, and amalgamation with the north might not be to the south's advantage. Those at Aberdare, again in South Wales, considered that a link-up with the north would probably mean increased tariffs. Rural areas in North Wales were now attached to industrial Merseyside.

The proposal found support among Towyn-Aberdovey councillors. Wales, it was said, already had its own authorities in other spheres, and it appeared that the only people out of step were the Merseyside and North Wales Board. One member, while saying he was not against the measure, added that it ought to be carefully considered before action was taken. If North Wales did not have the Mersey's industrial areas, it would have those of South Wales, he said.

The original resolution on this subject came from Caernarvonshire County Council.

Day and night views along Wergs Road, Tettenhall, where Revo Electric have recently employed long brackets taking the lighting fittings to the centre of the road

Gas Turbine the Most Efficient Machine

EFFICIENT use of fuel was once more the subject for a lecture last week, when Mr. W. E. P. Johnson, A.F.C., C.P.A., addressed the Royal Society of Arts on the "Use and Abuse of Fuels." Mr. Johnson, who is managing director of Power Jets (Research and Development) Ltd., the Government controlled gas-turbine patent managing concern, was naturally optimistic about the use of the gas turbine, which he claimed could readily surpass any existing machine in reducing inefficiency, provided it was properly designed and equipped for a particular duty. He claimed as an additional advantage of this type of prime mover, that it rejected its waste heat at a temperature high enough to make it useful for various purposes.

Although he recognised that higher efficiency often meant much higher capital costs, the speaker argued that such expenditure was well justified in view of the seriousness of the fuel resources position. While he did not fully discuss nuclear power, he did suggest that it might be used to obtain carbon as a fuel from highly plentiful chalk. On domestic heating, however, he had little to say beyond offering a word of praise for the activities of such bodies as the Coal Utilisation Council and the Smoke Abatement Society.

I.E.S. DOW PRIZE

RESULTS of the first Dow Prize competition, to be held biennially, have just been announced by the I.E.S. Inaugurated last year, the first contest was designed to encourage collaboration between engineers and architects and took the form of the layout, artificial lighting and decoration of a ground-floor sports shop. Twenty-six entries were received, the majority being from teams. Winners of the first prize of £75 were a team of six. All entries will be on view at a special meeting of the Society in London on February 25, when awards will be presented and entries discussed.

Australians Arrive For Training in U.K.

REFERENCES have been made previously in these columns to the F.B.I's Overseas Scholarships Scheme. It is primarily a long-term plan to boost British exports in countries which are, or will be, undertaking development programmes. Under the scheme it is proposed to train between 150 and 200 engineers in British engineering works. Four young graduate engineers arrived in this country last week from Australia, closely followed by the first Indian graduate to be granted a scholarship under the scheme. The four Australians will be followed in the next few weeks by seven fellow-countrymen. As a result of last year's visit to S. America, 50 scholarships will be granted to Latin-American engineers annually, and recommendations are now being considered.

Lighting for Middlesex Cricket School

READERS may remember that some 21 months ago, we reported the lighting installation used in the Essex County Indoor Cricket School at Romford and planned by Ekco-Ensign Electric Ltd. So successful has that scheme proved that it occasioned little surprise when the same company was asked to handle the lighting in the new Middlesex school, opened by Sir Pelham Warner at the beginning of this month.

Much the same technique was adopted. Single 5 ft 80 W batten fittings (FF17) were selected and mounted flush to the ceiling in groups of three across the line of the pitches. So as to produce a slightly higher level of illumination at the batsmen's end the distance between rows was decreased in that area. The biggest problem to solve was to prevent the batsman receiving a sight of the bare fittings—this being done by the simple process of fixing canvas pelmets to the ceiling on the batsman's side of the lamp. There was too, the question of colour. The ceiling is pale blue, and from past experience it was decided to install warm-white and white lamps alternately.

The actual installation was carried out by West and Turner Ltd., who also did the same task at Romford, and architects were Stewart and Hendry.

Looking down one of the pitches at Middlesex C.C.C's new indoor school for young cricketers. The effect of canvas pelmets over the pitch at the far end can just be seen. There are four pitches altogether — all four batsmen being in the centre of the school

BOARD REPORTS ON ELECTRIC HAY-DRYING

AN interim report of experiments carried out in the N. of Scotland Hydro-Electric Board's area was given last week by the Board's chairman, Mr. T. Johnston. These trials have been going on for about five years now on a number of farms in various districts. The cost of installation is about £600 if the drier can be built under cover, and by the process of blowing cold and electrically heated air alternately through the hay, the results are beginning to emerge in cost savings to the farmers, it is reported. Losses from traditional methods of hay-making are estimated at 40%, but the trials indicate that losses from electrical hay-drying are less than 20%. One farmer also claimed that the value of his sheep had increased by £850 as a result of feeding dried hay to them. Mr. Johnston thought the system a practical proposition for most farmers. He said this was an interim report only and experiments were continuing. It might be possible to cheapen installation costs. Four farmers who had co-operated in the experiments to date had, without exception, expressed complete satisfaction.

Severe Damage to Lamp Factory

CONSIDERABLE damage was sustained by the Ferguson Radio Corporation Ltd., a subsidiary of Thorn Electrical Industries Ltd., following a fire which broke out at their Hirwaun (Aberdare) factory. A statement on the disaster by the parent company says, first of all, that production of radio and TV receivers will not be affected. The factory was concerned with the production of fluorescent fittings, and the loss of output at Hirwaun should be overcome by the transfer of work to other of the Group's factories.

Reports from South Wales indicate that most of the modern plant for the manufacture of lighting fittings was severely damaged and will not be worth salvaging. Damage has been estimated at £250,000.

Manchester Complaints

RESTRAINT in the purchase of electrical goods is a prominent feature of the annual report of the Engineering and Metals section of Manchester Chamber of Commerce. It states that the serious restraining influence of hire purchase restrictions and purchase tax have been aggravated by the B.E.A's continuous appeals to confine the use of domestic appliances to off-peak hours. Services which cannot be used freely without a sense of guilt rapidly become unpopular, it is alleged.

The report also attacks the Excess Profits Levy. This was hindering the proper development of electrical manufacturing firms in the area, and the retarding of home business was having its effect on export efforts.

I.E.E. Utilisation Section Entertains

VENTURING for the first time on an independent dinner-dance, the Utilisation Section of the I.E.E. achieved marked success with a function enjoyed by over 130 members and guests last week. In the chair was Dr. J. W. T. Walsh, while the guests included the President of the Institution, Col. B. H. Leeson, and Mrs. Leeson, Mr. and Mrs. W. K. Brasher, and the Chairman of the measurements and radio sections of the Institution.

Speeches on this pleasurably informal occasion were kept short. After Dr. Walsh's welcome to the guests, Col. Leeson conveyed the best wishes of the Institution as a whole, and spared a serious moment to remind all present of the part the electrical industry had to play in enabling Britain to take her important place in the world again in this new era.

NEWS IN BRIEF

We gratefully acknowledge receipt of good wishes and a calendar from Permali, Ltd.

The sixtieth Royal Netherlands Industries Fair will be held in Utrecht between March 17 and 26.

Ten prizes and 150 certificates were awarded to students and apprentices of Siemens Bros. at Woolwich recently.

Some details of a career as a marine radio officer are set out in an attractive 32-page brochure produced by Marconi International Marine Communication Co.Ltd.

A new radio-telephone service is now being operated by Cable and Wireless Ltd., between Muscat and Bahrain.

The £1m Government loan scheme to increase fuel efficiency was disappointing, stated Mr. L. S. Yoxall, chairman at annual luncheon of B.I.M.C.A.M. Measuring instruments could give better results, but had been omitted from the list of equipment qualifying for loans.

Some agreement has been reached between the Government and Ironfounders concerning the latter's position under the Iron and Steel Bill.

The "25 Club" of McKechnie Bros. Birmingham works held their inaugural meeting recently.

Sterling Cable Co. entertained nearly 250 children at their annual party for children of employees.

Dr. J. N. Aldington is to speak on "Research and the Lamp" at the Philharmonic Hall, Liverpool, next Thursday. It is being organised by the Merseyside Electric Lighting Services Committee.

I.T.D. Ltd., subsidiary of Austin Crompton Parkinson Electric Vehicles, are to supply mechanical stacking and handling machines valued at £469,000 to the China National Import Export Corpn.

Heenan and Froude Ltd., have just sent to A. V. Roe Ltd., Canada, four of their hydraulic dynamometers for use in the development of gas turbine aircraft engines.

Electric Supply News . . .

Ashford (Kent)

Five 2,000 kW generators have been ordered by the B.E.A. from Mirrlees, Bickerton and Day, Ltd., for the new power station to be built at Ashford, Kent. The engines, to run on low-grade fuel oil, will be direct coupled to Brush 2,500 kVA alternators. Two sets are due for completion by October, 1954, and the remainder by the following autumn.

Exmoor

In an effort to obtain an extension of electricity supplies to Exmoor the Dulverton Rural Council is taking up the matter with the South Western Electricity Board.

Frome

The Urban Council may shortly be in difficulties about heating of water for the corporation baths. At the moment heating is from steam obtained from the B.E.A's local power station. But the Authority has now advised the Council to install its own heating unit at the baths. The B.E.A. has pointed out that it would be uneconomic and unacceptable to the Authority to continue the supply of steam under the existing terms, which involved giving a supply when the station was in commission, but not actually generating, and the supply might be discontinued for increasingly long periods as the station was quite likely to be closed down completely for three months this year. In the meantime the B.E.A. was prepared to afford a steam supply at such time only as when the station was in commission, at an adjusted price. The Council is to consider the matter.

Glasgow

In 1949 the South West Scotland Electricity Board approved of a major scheme for the reinforcement of the network at 33 kV in the southern area of Glasgow, which included the construction of 33/11 kV substations at Newlands and Burnfield (Thornliebank). A scheme has now been approved by the Board providing for the necessary modifications to the existing 11 kV network in that area following upon the construction of the 33 kV network. This comprises the establishment of two new 11 kV substations at Mearns Castle and Giffnock Colliery, the installation of 250 MVA switchgear at other existing 11 kV substations, and the laying of new lengths of 11 kV underground cable. The total cost of this work is estimated at £154,300 and it is intended to complete it by 1956.

Herefordshire

The residents of Vowchurch Common, 10 miles from Hereford, are now hoping that they will get their first supply of electricity in March. It is reported that contracts were signed with the Midlands Electricity Board in 1949. The Board wired the houses, and many residents purchased appliances, it is stated, but have since had to use paraffin for cooking and lighting purposes. On their behalf, Mr. J. P. L. Thomas, M.P. for Hereford, and First Lord of the Admiralty, has taken up the matter with the Board, who have intimated that a supply should be available about March.

Londonderry

The Corporation Electricity Committee has approved a proposal of the city electrical engineer, Mr. R. V. Macrory, that a loan of £17,000 be raised to carry out certain extensions to the city electricity service and to purchase new equipment.

North-Eastern

The quarterly report of the North-Eastern Electricity Board submitted to a meeting of the North-Eastern Consultative Council stated that a further 82 substations had been brought into operation. These included 20 in the Tyne sub-area; 17 in the Wear area; 16 in the Tees area; 22 in the York area; and seven in the Harrogate area. Forty-four of these substations were for supplies to villages and farms and the remainder for new housing estates and reinforcing the load on existing networks. During the quarter 104 farms were connected compared with 106 in the same period of 1951. In addition, 11 villages were supplied. During the quarter, the Board approved development schemes costing £859,747, including 84 housing and 57 rural schemes. The Board reported that surveys for the transfer to the Electricity Board of networks owned by the National Coal Board were in hand.

Northern Ireland

Lack of promotional advertising by E.D.A. is one of the reasons for the reduction in sales by the Electricity Board for Northern Ireland last year. This is the view of Sir Willian Robinson, chairman of the Board, who has pointed out that the latter is able to meet normal power demands in the area. Units sold by the Board during 1952 amounted to 302·8 millions, only 4% above the 1951 figure, and for many months of the year, sales were below the corresponding months of the previous year. The fall in consumption was also reflected in the sales of appliances which were £30,000 down on the year. On the question of the absence of promotional advertising, Sir William in his review of the Board's activities last year, refers to the invidious position in which the Board is placed. The undertakings in N. Ireland are members of E.D.A., most of whose revenue is obtained from the B.E.A. and the Area Boards. It would appear that the Association is not entirely independent, he says, but must conform to any restrictions placed upon it by the Ministry of Fuel and Power. In view of the Ridley Report recommendation that consumers should be given freedom of choice of fuel, he considers it difficult

to understand the reason for the restriction of promotional advertising. For, he explains, E.D.A. advertisements which previously appeared in the National Press in Great Britain were always repeated in the Northern Ireland Press. Showroom displays alone, Sir William maintains, are quite inadequate to cover the needs of the general body of consumers.

LIGHTING SCHEMES

Bootle.—Application is being made to the M.o.T. for consent to borrow £5,506 for providing sodium lighting in Rimrose Road, Derby Road, Knowsley Road and Strand Road.

Broadstairs.—Formal consent has been received from the Ministry of Housing and Local Government for the borrowing of £1,829 for the provision of improved street lighting in High Street, Broadstairs, Queen's Road and Ramsgate Road.

Bromley (Kent).—It is proposed to spend £1,350 on illuminations for the Coronation celebrations.

Darlington.—T.C. has received sanction to borrow £2,550 for street lighting on the Firth Moor Estate and £4,470 for improved street lighting in Coniscliffe Road. Loan sanction is being sought for £1,150 for 25 street lamps on the Springfield housing site.

Devizes.—The deputy surveyor is preparing a scheme for street lighting at Home Farm estate.

Durham.—The T.C. is seeking loan sanction for £2,420 for the re-lighting of Sutton Street and Crossgate Path.

Longbenton (Northumberland).—U.D.C. is seeking permission to install lighting on the Great North Road between Wideopen and Seaton Burn and from Four Lane Ends to Clousden Hill.

Thornton Cleveleys.—The Lighting Committee is seeking M.o.T. approval of a £12,250 street lighting scheme.

Warrington.—T.C. has approved the installation of improved lighting in various roads at a cost of £9,360.

Company Activities . . .

Aiton & Co.

Full particulars were announced yesterday (Wednesday) of the placing of 203,175 6½% £1 Cumulative Preference shares for this Derby firm of pipework specialists. It is expected that dealings in the shares will start on January 26.

British Relay Wireless & Television Co.

Integration of the radio and the television relay businesses now carried on separately by the British Relay Wireless Group and the Link Sound and Vision Services group (which is jointly owned by Pye Ltd. and Murphy Radio) is planned in the formation of this new concern. Application is being made to the Capital Issues Committee for permission to form a holding company with an issued capital of £400,000 in 6½% Unsecured Loan Stock, 1960/67, £300,000 in "A" Ordinary shares of 5s. each and £175,000 in "B" Ordinary shares of 5s. each, in order to acquire the share capital of the companies comprising the two groups. Major G. H. Martin, who has been in charge of operations of the British Relay Wireless Group since 1945, will, it is intended, be managing director of the new company. The whole of the "B" capital will be taken up by Pye Ltd. and Murphy Radio, and their associated companies. Arrangements for the issue of the other shares, the Loan stock at par and the "A" Ordinary at 10s. each, are nearing completion.

Lindley Thompson Transformer (Holdings) Ltd.

For its first year as a public company a dividend of 12½% is being paid. This is as was suggested in October, 1951, when the 6% Preference and Ordinary shares were marketed. The net profit for the year ended September 30 last is £22,677 after providing £40,961 for taxation, according to the preliminary statement.

R. A. Lister & Co., Ltd.

With an unchanged final dividend of 6½%, the total distribution for the year is again 9%. The preliminary statement shows that the group profit for the year to September 30 last, increased by nearly £50,000 to a total of £677,073.

Negretti & Zambra

In announcing a final dividend of 17½%, making 22½% for the year ended September 30 last, the same as previously, the preliminary statement adds that the approximate net profit is £84,086 as compared with £85,983 for the preceding year.

L. Sterne & Co.

After allowing for all charges, including taxation, there is a small increase in the net profit for the year ended October 31 last by this firm of refrigerator manufacturers. The preliminary statement shows a net profit of £94,327, compared with £91,220 for the previous year. The dividend is again 15% on Ordinary capital which was increased from £156,000 to £234,000 by an issue of shares for cash.

Dividends Declared

Broom and Wade.—Final Ordinary of 10%, making 14% (*11¼%*).

Globe Telegraph and Trust Co.—Interim of 3% payable on February 28.

Greenwood and Batley.—Interim of 5% (*same*).

Hackbridge Cable Holdings.—Interim of 7½% (*same*).

Rangoon Electric Tramway and Supply Co.—Ordinary dividend of 50 pyas per share, free of Burmese tax. This is the first Ordinary dividend since 1941.

Commercial Information

CONTRACTS OPEN

HOME

Jan. 24.—Bootle T.C. Supply of electric lamps and other goods during year beginning April 1. Borough Surveyor, Town Hall.

Jan. 24.—Laurencekirk. Electrical work in erection of police station. Applications to County Architect, 34 Market Sq., Stonehaven.

Jan. 24.—Oxford. Supply of electrical equipment for Barton End old people's home. Chief Welfare Services Officer, Greyfriars, Paradise Street.

Jan. 24. — Ruislip - Northwood U.D.C. Supplies required during year beginning April 1 next include electric lamps. Engineer and Surveyor, Council Offices, Northwood, Middx.

Jan. 26. — Carlisle. Electrical installation in 30 houses in Harraby Neighbourhood Unit. City Engineer, 18 Fisher Street.

Jan. 26.—Finchley B.C. Supply of (a) 47 lanterns with 140 W sodium control gear and fuses, and (b) 47 concrete columns. Separate contracts. Borough Engineer and Surveyor, 294-296 Regents Park Rd., Finchley, N.3. Deposit £2 in each case.

Jan. 26.—Runcorn U.D.C. Electric lamps included in list of supplies wanted for year ending Mar. 31, 1954. T. J. Lewis, Clerk of Council, Town Hall.

Jan. 26.—Rushden U.D.C. Supply and installation of 31 two-tube fluorescent lighting tubes and ten 250 W mercury lanterns, all on concrete columns along Wellingborough Rd. and Church St. Engineer and Surveyor, Council Buildings.

Jan. 26.—Westminster. Tenders invited for supply of electric lamps, cable, etc., during 12 months beginning April 1. Town Clerk, City Hall, Charing Cross Rd., W.C.2.

Jan. 26.—West Riding. Reinstatement of electrical installation at Castleford Whitwood Mining and Technical College. County Architect, Bishopgarth, Westfield Rd., Wakefield. Deposit £2 2s. (See Jan. 1 issue.)

Jan. 26.—Wrexham R.D.C. Wiring for electric light and power in 37 dwellings at Johnstown, 6 at Owersyllt, and 29 at Ruabon. T. A. Bowen, Deputy Engineer and Surveyor, Imperial Buildings, Regent St. Deposit £2 2s.

Jan. 27. — Caithness. Tenders invited for electrical work in 72 houses on various estates—1953 building programme. W. Wilson, County Architect, Wick.

Jan. 27.—Risca (Mon.) U.D.C. Supply and installation of illumination equipment for seven pedestrian crossing beacons. Engineer and Surveyor, Council Offices.

Jan. 27.—Wrexham T.C. Supply of columns, time switches, lanterns and equipment and installation of 102 sodium units and 22 fluorescent units for street lighting on trunk road A483. Borough Engineer and Surveyor, 31 Chester Street. Deposit £2 2s. (See Jan. 1 issue.)

Jan. 28.—Dublin. Rewiring of power circuits in laundry at St. Kevin's Hospital, and extension of system. Deputy Secretary, 1 James's St. Deposit £3 3s.

Jan. 28.—Dunsany (Eire). Electrical installation at Grange Farm. Documents from J. Tyrrell, secretary, Office of Public Works, Dublin. Deposit £1.

Jan. 28.—Friern Barnet U.D.C. Supply of street lighting lamps (metal filament, sodium and mercury) for year beginning April 1. Engineer and Surveyor, Town Hall, N.11. (See Jan. 8 issue.)

Jan. 28.—New Mills (Lancs.) U.D.C. Group B street lighting installation of 30 lamps, in Church and Low Leighton Rds. Documents from Council Surveyor's Office, Town Hall.

Jan. 28.—N. Ireland. Lighting, power and bell installation at Downpatrick General Hospital. J. R. W. Murland, Consulting Engineer, 13 Wellington Place, Belfast. Deposit £5 5s.

Jan. 28.—Scunthorpe T.C. Supply of electric lamps required during year ending Mar. 31, 1954. Cyril Cooper, Borough Engineer and Surveyor, Comforts Ave.

Jan. 30.—Belfast. Wiring for electric light and power and supply of fittings at Stormont Presbyterian Church. Architects are T. T. Houston and Co., 26 College Gdns., Belfast. Deposit £3 3s.

Jan. 30.—Belfast. City's Electricity Dept. is inviting tenders for various materials, including time switches, distribution transformers, cables, switchgear, lamps, washboilers, kettles, etc. Dept. is at East Bridge St., Belfast. Fee 10s. (See Jan. 8 issue.)

Jan. 30.—Bethnal Green B.C. Electric lamps included in list of items required during year beginning April 1. F. H. Bristow, Town Clerk, Town Hall.

Jan. 30.—Haltemprice U.D.C. Supply and erection of two submersible vertical spindle "Fullway" centrifugal pumps (375 g.p.m.) with electric motors, starters, control gear, etc. Engineer and Surveyor, Anlaby House, Anlaby, E. Yorks. Deposit £2.

Jan. 30.—Leeds. Supply, erection and maintenance of two vertical spindle centrifugal borehole pumps (125 g.p.m.) with electric motors and switchgear. General Manager and Engineer, Waterworks Dept., Civic Hall.

Jan. 31.—Edinburgh. Installation of lighting and power points and electric lift in third section of extension scheme at Heriot-Watt College. Applications by above date to J. Y. White, Clerk to Governors, Chambers Street.

Jan. 31.—Prestwich T.C. Lamps and other electrical equipment wanted during year ending Mar. 31, 1954. Borough Engineer, Town Hall.

Jan. 31.—Salford. Supply of all kinds of street lighting equipment, including concrete columns, lanterns, lamps, cables, etc., required for year beginning April 1. Street Lighting Superintendent, Bloom St., Salford 3.

Jan. 31. — Sevenoaks U.D.C. Re-wiring in screwed conduit throughout swimming and slipper baths. Engineer and Surveyor, Council Offices, Argyle Rd. Deposit £2 2s. (See Jan. 1 issue.)

Jan. 31. — West Lancashire R.D.C. Supply, erection, etc., of 53 sodium lighting units on concrete columns along (approx.) 1,810 yd. of Liverpool-

Preston Rd. at Maghull. R.D.C. Office, 52 Derby St., Ormskirk. Deposit £2 2s. (See Jan. 1 issue.)

Jan. 31.—Worthing T.C. Supply of flashing beacon assemblies. Borough Engineer and Surveyor, Town Hall.

Feb. 2.—Gillingham (Kent) T.C. Annual contracts include supplies of switches, conduit, wire, cables and accessories, cooker, wash boiler and fire spares, and electric lamps. Borough Engineer and Surveyor, Municipal Buildings.

Feb. 2.—Maidstone T.C. Rewiring and replacement of fittings in 43 houses in Cherry Orchard Way. Borough Surveyor, Palace Ave.

Feb. 2.—Ormskirk U.D.C. Rewiring of electrical installation and services at R.N.A.S. Camp, Burscough. Surveyor to Council, Council Offices, Burscough St. (See Jan. 15 issue.)

Feb. 2.—Salford. Complete electrical installation in 36 flats in Devonshire Rd. City Engineer and Surveyor, Town Hall. (See Jan. 15 issue.)

Feb. 2.—Stoke-on-Trent. Supply of electric lamps required during six months ending Sept. 30. City Surveyor, Town Hall.

Feb. 3.—Liverpool. Wiring of Ward 17 at Sefton General Hospital. Garnet Chaplin, Secretary, S. Liverpool Hospital Management Ctee., Sefton General Hospital.

Feb. 4.—Southwark B.C. List of supplies for annual contracts includes electric lamps. Town Hall, Walworth Rd., S.E.17.

Feb. 4.—Poplar B.C. List of supplies required for year beginning April 1 includes electric lamps. Particulars from Town Clerk, Town Hall, Bow Rd., E.3.

Feb. 5.—Co. Down. Electrical installation in Ballyholme primary school. W. D. R. and R. T. Taggart, architects and civil engineers, 36-38 Castle Arcade Buildings, Belfast. Deposit £3 3s.

Feb. 7.—Swansea T.C. Supply of electric lamps for public lighting for 12 months from April 1. Borough Engineer and Surveyor. Guildhall.

Feb. 9.—Stepney B.C. Installation of lighting and power points and two lifts in 56 flats and 8 shops on Bancroft Rd. estate. Borough Engineer and Surveyor, 227-233 Commercial Rd., E.1. Deposit (in case of lighting and power points) £5.

Feb. 10. — Shoreham-by-Sea U.D.C. Provision and erection of 71 concrete columns, sodium lanterns and auxiliary equipment for street lighting in Old Shoreham and Brighton Rds. Engineer and Surveyor, J. Dunn, 31 John St. Deposit £2 2s.

Feb. 12.—Co. Down. Electrical installation in kitchen at Abercorn primary school. A. N. Irens, consulting engineer, Bennett Building, 46 Donegall St., Belfast. Deposit £3 3s.

Feb. 13.—Huddersfield T.C. Supplies of tungsten filament, mercury and sodium lamps and cable required during year ending Mar. 31, 1954. Borough Engineer and Surveyor, High St. Buildings.

Feb. 14.—Fife. Electrical work in erection of police station and houses at Cowdenbeath. Wilkinson and Lowe, quantity surveyors, 2a Chalmers St., Dunfermline.

Feb. 16.—Blackpool T.C. Supply of mercury arc rectifier transformer and switchgear equipment. Documents from General Manager, Corporation Transport, Blundell Street.

Feb. 16. — Manchester. Rewiring and additions to electrical installation at Buglawton Hall special school, near Congleton. City Architect, Town Hall. Deposit £1 1s. (See Jan. 15 issue.)

Feb. 18.—Wandsworth B.C. Applications invited for names of contractors to be placed on Council's list for works up to and over £500. Documents from Borough Engineer, Municipal Buildings, S.W.18. (Advertised in this issue.)

Feb. 26.—Dewsbury T.C. Supply of various street lighting equipment, including lanterns, lamps, cables, brackets, control gear, columns. C. H. Midson, Street Lighting Engineer, 27 Battye Street. (Advertised in this issue.)

Mar. 4.—Manchester. Supply and erection of four centrifugal pumps with electric motors, automatic switch and control gear, etc., for Poundswick B Booster station. Secretary, Waterworks Offices, Town Hall. Deposit £1 1s.

No date stated.—Buxton T.C. Electrical installation in 48 houses on Victoria Park estate No. 2. A. C. W. Ryland, borough engineer, Town Hall.

No date stated.—N. of Scotland H.E. Board. Erection of 132 kV line between Brechin—Bridge of Dun. Applications to Kennedy and Donkin, Alliance House, 12 Caxton St., London S.W.1. Deposit £2 2s.

Your Queries — Answered

"Fit-All" fire elements, makers of? A.B.—S. I. Engel, 23/25 Kensington Park Rd., W.11 have a product termed as the "Fit All Universal" element. (24845)

"Majobell" door bell, makers of? H.G.—V. and E. Friedland Ltd., Lower Heys Mill, Macclesfield. (24859)

Flameproof fan marked with B.o.T. No. 1268, makers of? E.C.—Lancashire Dynamo and Crypto Ltd., Trafford Park, Manchester 17. (248567)

"Fibreglass" covered element wire, suppliers of? J.E.—Electrothermal Eng. Co., Ltd., 270 Neville Rd., London E.7. (248579)

"B.E.S." electromedical apparatus, makers of? T.E.—Barber Electrical Services Ltd., Beaumont Rd., Bournville, Birmingham 29. (248582)

"Essco" fires, makers of? L.E.—J. and J. Siddons Ltd., Hill Top, West Bromwich. (248590)

"Pearlette" switches, suppliers of? D.N.—Falk Stadelmann and Co., Ltd., 91 Farringdon Rd., London E.C.1. (248598)

"Easy Co." washing machines and ironers, agents of? H.D.—Metalcraft Mfg. Co. (Canada), Ltd., 37 Berners St., London W.1. (248604)

The above are selected from questions we have answered this week. If you have a query, send it to us.

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

Feb. 11.—South Africa. Supply of various quantities of lampholders, sockets, junction boxes, inspection tees, elbows, lock nuts, plugs with fuses and tumbler switches for train lighting. Documents available from High Commissioner for Union in London. Items required by S. African Railways.

Feb. 18.—India. Govt. of Travancore-Cochin invites tenders for supply of 7,700 coils (100 yd. each) of V.I.R. and W/P cables. Stores Purchase Committee, Trivandrum. B.o.T. (Ref.: CRE 1095/53).*

Feb. 18.—South Africa. Supply of 19 three-phase transformers—six having continuous maximum rating of 750 kVA, ten of 500 kVA, and 100 kVA. Cape Town City Electrical Engineer, Electricity House, Strand St. B.o.T. (Ref.: CRE 759/53).*

Feb. 26.—Uruguay. Supply of some 9,000 metres of underground cable to various specifications for use with 3-phase distribution networks of neutral insulation. Usinas Electricas y Telefonos del Estado. B.o.T. (Ref.: CRE 521/53).*

Mar. 14.—India. Supply of total of 36,000 H.T. insulators to various specifications for Govt. of Travancore-Cochin, Trivandrum. B.o.T. (Ref.: CRE 44056/52).*

Mar. 17.—Uruguay. Supply of transformers and other electrical materials for substations. Usinas Electricas y los Telefonos del Estado Montevideo. B.o.T. (Ref.: CRE 155/53).*

Mar. 28.—India. Supply of lightning arresters to various specifications. Stores Purchase Committee, Govt. of Travancore-Cochin, Trivandrum. B.o.T. (Ref.: CRE 152/53).*

April 30.—Iraq. Baghdad Water Board requires four low-lift pumps with electric motors, four high-lift pumps with same, two air blowers, a sludge pump, starters, control panel, switchgear cables, two transformers, etc. B.o.T. (Ref.: CRE 1238/53).*

May 6.—South Africa. City of Capetown Electricity Dept. requires supply of 66 kV and 33 kV cables, jointing material and ancillary equipment. B.o.T. (Ref.: CRE 760/53).*

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	285 0 0	—
LEAD, good soft pig (foreign)	99 10 0	112 0 0
,, ,, "English" quality	101 0 0	
Tin (99-99·75%) (Cash)	954-965	—
,, (3 months)	942-943	—
ALUMINIUM, commercial purity (del.)	166 0 0	—
ZINC	87½-88	100 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	52 0 0	—
Mild Steel Tape (0.04 in.)	39 15 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

L. P. Fox and Co., Ltd., Stockton Heath. Eric S. Browne, 41 North John St., Liverpool, has been appointed liquidator with committee of inspection.

W. J. M. Holdings, Ltd. Meetings of creditors and contributories are to take place at Inveresk House, Strand, London, W.C.2, to-day (Thurs.) at 11.30 a.m. and 12 noon respectively.

Welwyn Electricity Installations, Ltd. Meeting of members will be held at Wigmores North, Welwyn Garden City, on March 12, at 11 a.m., to receive liquidator's report.

Lincoln Electric Welding Works Ltd. Creditors are asked to send particulars to liquidator, R. F. Prior, C.A., General Buildings, Bridlesmith Gate, Nottingham, by Feb. 14.

Partnership Dissolved

W. E. Gilbert and Co. Partnership between W. E. Gilbert and R. S. Tuttrett, trading as electrical heating engineers at 23 Oakfield Rd., Rugby, dissolved as from Dec. 31. Debts received and paid by R. S. Tuttrett, who will continue business.

BANKRUPTCY ACTS

Receiving Order

Wandsworth. William E. J. Hardy, electrical engineer and contractor trading at 187 Putney Bridge Rd., S.W.15. Date of receiving order, Jan. 8.

Manchester. Frank L. Napier, electrical contractor, trading at 5 School Rd., Sale. Date of receiving order, Jan 12.

Intended Dividends

Blackburn. Stafford Green, electrical contractor of 373 Bolton Rd., Darwen. Last day for receiving proofs, Jan. 27. Trustee is F. C. Ormrod, 20 Byrom St., Manchester.

Kendal. Stephen Edmondson, electrical dealer and contractor, trading as E. and B. Radio at Main St., Milnthorpe. Last day for receiving proofs, Jan. 27. Trustee is L. H. Shipton, 31 Lloyd St., Manchester.

First Meeting

Birkenhead. Gordon Towell, electrician of 183a Grange Rd., Birkenhead. Meeting takes place at Official Receiver's Office, West Africa House, Water St., Liverpool, today (Thurs.) at 11 a.m. Public examination will be at The Court House, Pilgrim St., Birkenhead, on Feb. 18, at 11 a.m.

Dividends

Rochdale. Jack Hilbert, radio and electrical engineer of 17 Manchester Rd., Haslingden, Rossendale. First and final dividends of 2d. in £ payable tomorrow (Fri.) at Trustee's office, 47 Mosley St., Manchester.

Release of Trustee

Canterbury. Nicolaas A. R. Spreeth and Stanley H. Price, trading as Refrigeration Installations Co. at Sea St., Herne Bay. Trustee was E. C. Williams, Inc. Acc., Midland Bank Chambers, Herne Bay.

CONTRACTS PLACED

Bromley T.C. Street lighting along A.21, General Electric Co., £7,310.

Coventry. Part of electrical work at Woodlands Comprehensive secondary school, Lee, Beesley and Co., Ltd., £6,945.

East Kilbride. Electrical installation in secondary school at Duneraig Development, Claud Hamilton, Ltd., £11,272.

Newcastle-on-Tyne. Substitution of electricity for gas in 930 houses on Walker estate, J. and D. Ellison Ltd., £20,184.

BUSINESS PROSPECTS

HOME

Abercarn (Mon.) U.D.C. Erection of 36 houses at Part, Newbridge. M. T. Benjamin, surveyor and engineer, Council Offices.

Airdrie. Dean of Guild Court has approved factory extension in Rochsolloch Rd. for Grit Co. of Scotland, Ltd.

Ayr T.C. Approval granted for erection of 52 houses in Craigie Way and 50 in James Campbell Road.

Birkenhead. Extensions to Rock Ferry high school approved. Also application to be made for sanction to borrow £89,473 for first part of Fender primary schools.

Bredbury (Ches.) U.D.C. Construction of 264 houses on Goyt Valley and Mill Lane estates. T. P. Hodkinson, surveyor, Council Offices.

Brighton T.C. Erection of 13 dwellings on Hollingdean estate and 76 on Woodingdean estate. Borough Engineer and Surveyor, 26-30 King's Road.

Cardigan. Erection of Dinas secondary school at Cefullan. G. R. Bruce, County Architect, County Hall, Aberayron.

Devizes T.C. Approval sought for construction of 128 houses at Drake's Farm.

Doncaster T.C. It is proposed to build a further 292 houses on Cantley and Intake estates.

Dublin. Erection of 250 houses in Rathfarnham area. City Treasurer, Exchange Buildings, Lord Edward St. Contract for further 118 houses may also be placed as result of these tenders.

Fareham U.D.C. Construction of 41 dwellings at Serisbury. Engineer and Surveyor, Westbury Manor.

Flintshire. Construction of junior and infants' school at Worthenbury. W. Griffiths, County Architect, Llwynegrin, Mold.

Halifax T.C. Erection of 56 flats at Mixenden and Illingworth. G. Holden, Borough Engineer, Crossley Street.

Hull. Construction of Bellfield Av. primary school. A. Rankine, City Architect, Guildhall.

Leeds. Approval in principle given to scheme for rehousing over 5,000 people in blocks of flats in York Rd. area. Project estimated to cost between £2¼m and £3m. Also, final plans being prepared for 530 flats in Marsh Lane.

London. Knott Hotel Corporation are proposing to build a seven-storey hotel in New Bond St. Michael Rosenauer, architect, 86 Brook St., W.1.

Middleton T.C. Erection of 140 houses and 24 flats on Hollin estate. J. Pollard, Borough Architect, Town Hall.

Paisley. Erection of Protestant and R.C. primary schools at Larkfield. Costs estimated at £124,050 and £136,400 respectively.

Rotherham. Two new schools to be built in Rother Valley. They are at Thrybergh, to cost about £135,000, and at Sunnyside, £38,350.

South Shields T.C. Construction of 77 houses on Simonside estate. Borough Engineer, Town Hall.

South Shields. £318 is to be spent renewing wiring at Wesley St. offices and lighting in classroom at School of Art.

Woking U.D.C. Erection of 101 houses on Maybury estate. H. P. Tame, Engineer and Surveyor, Council Offices.

Wrexham. Victory Fund Management Committee has approved final plans for erection of Victory Hall in Regent St. Estimated cost £57,000.

OVERSEAS

Canada. Western Canadian representation of a U.K. manufacturer of a.c. generators of 5 kVA to 75 kVA sought by A. R. Williams Machinery Western, Ltd. 495 Railway St., Vancouver. Write direct to Mr. Leo Brooks.

Also, Pratt Representatives' (NFLD), Ltd., Steer Building, 379 Water St., St. John's, Newfoundland, wish to obtain agencies from U.K. manufacturers of immersion heaters-water storage tanks with thermostatic control, and fires. Contact Mr. J. C. Hudson, managing director.

Trinidad. G. H. Brinkley and Associates wish to secure agency representation for whole of British West Indies in respect of U.K. manufacturers of electrical goods and equipment, including cable, electric tools, meters, household appliances. Address is 87a Cipriani Boulevard, Port-of-Spain.

TRADE NOTES

Changes of Address. C. Mackechnie Jarvis and Partners, consulting engineers, have moved to 53 Victoria Street, S.W.1. Telephone: Abbey 4751.

The Birmingham branch office of Elliott Brothers (London) Ltd. is now at 181 Corporation Street, Birmingham, 4. Telephone: Central 8313. Process-control interests are in the hands of Mr. A. H. Robinson and Mr. H. F. Johnson, while Mr. G. F. Thomas specialises in electrical measuring instruments.

Beama Contract Price Adjustment Formulae. *For Electrical Machinery and Equipment.* For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at January 17, 1953, shall be deemed to be 141s. 6d. (*b*) "Cost of Material"—the index figure for Materials used in the Electrical Machinery Industry, published in the Board of Trade Journal on January 17, 1953, is 162·7.

For Turbo-Generating and Allied Plant. For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at January 17, 1953, shall be deemed to be 141s. 6d. (*b*) "Cost of Material"—the index figures published in the Board of Trade Journal on January 17, 1953, are: Materials used in Mechanical Engineering Industries—148·9. "Blast Furnaces and Iron and Steel Melting and Rolling (40 and 41)"—142·4. The price of brass condenser tubes ¾ in. o/d. 18 SWG published in The Metal Bulletin on January 16, 1953, is 3s. 11½d.

For Outstanding Contracts covered by the B.o.T. Intermediate Products Index. For purposes of calculating variations in: (*a*) "Rates of Pay"—the rate of pay for adult male labour at January 17, 1953, shall be deemed to be 141s. 6d. (*b*) "Cost of Material"—the index figure for Intermediate Products published in the Board of Trade Journal on January 17, 1953, is 365·4.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 113 Chancery Lane, London W.C.2.

Bexar Ltd. Electrical engineers and contractors, etc. Cap.: £100. Dirs. to be appointed by subs. Subs.: Jean Herbert and Claire Moore, 128 Albany St., N.W.1.

Dalmere Electronics Ltd., Dunnabeck, White Moss, Grasmere, Westmorland. Electronic techniques, etc. Cap.: £3,000. Dirs.: T. Mewes and T. Hayhurst.

Gatehill Manufacturing Co., Ltd., 42 Notting Hill Gate, W.11. Mechanical and general engineers, electricians, etc. Cap.: £100. Dirs.: F. J. Constable and P. G. Belak.

Lawson and Parsons Ltd., Colne House, Guithavon St., Witham. To take over business of electronic engineer carried on at Thompsons Yard, Witham, Essex, by Gordon R. Lawson, as "G. R. Lawson and Co." Cap.: £3,000. Dirs.: G. R. Lawson and M. L. Parsons.

Lockwood and Son, Ltd. Electrical engineers and contractors, etc. Cap.: £500. Dirs. to be appointed by subs. Subs.: C. J. Lockwood, 16 Denford Grove, Kings Heath, Birmingham; and C. T. W. Lockwood, 39 Henlow Rd., Kings Heath, Birmingham.

Public Works Productions (Coventry) Ltd., 16 Little Park St., Coventry. Mechanical, electrical, water, gas and consulting engineers, etc. Cap.: £1,000. Dirs.: H. H. Lindop and D. H. D. Paul.

Southgate Finance Ltd., 40 Fore St., Edmonton, Middx. Hirers, hire purchase traders, dealers in automobiles, motor cars, radio, television and electrical accessories, etc. Cap.: £3,000. Dirs.: F. Skinner and Mrs. I. Skinner.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Newage Group in design. B710,808. Class 7. Welding machines, air compressors, alternators, etc. B710,809. Class 9. Engine-driven battery chargers. B710,810. Class 12. Trailers adapted for carrying welding machines, air compressors, etc. Newage Engineers Ltd., 282 Bury New Rd., Manchester 7.

Servomex. 710,566. Class 9. Electronic instruments. Servomex Controls Ltd., Crowborough Mill, Jarvis Brook, Sussex.

Regloscope. 711,337, **Reglograph** 711,339, **Reglograf** 711,340 and **Regloskop** 711,338. Class 9. Electronic instruments for checking and timing watch and clock movements. British Watch Timers, Ltd., Harley House, Shenley Rd., Boreham Wood.

MEETINGS TO NOTE

THURSDAY, JAN. 22

INCORP. PLANT ENGRS. (W. and E. Yorks Branch).—"Can there be a National Fuel Policy?" Oliver Lyle. Leeds University, 7.30 p.m.

I.E.E. (London Utilisation Section).—Three short papers. Savoy Place, W.C.2, 5.30 p.m.

INST. OF WELDING (N. London Branch).—"Joining of Aluminium." W. V. Binstead. The Polytechnic, Regent St., 7.30 p.m.

SATURDAY, JAN. 24

JUNIOR INSTN. OF ENGRS. (N.W. Section).—"Hydro-Electric Schemes." F. Burgess. 16 St. Mary's Parsonage, Manchester, 2.30 p.m.

MONDAY, JAN. 26

I.E.S. (Leeds Centre).—"Physical Principles Governing Fittings Design." W. H. Willott. 24 Aire St., 6.15 p.m.

I.E.S. (Leicester Centre).—"Automobile Lighting." K. J. Jones. Midlands Elect. Board, Charles St., 6.30 p.m.

I.E.E. (London Radio Section).—Discussion on "Relative Merits of Harmonic and Intermodulation Measurements for Assessing Distortion in Audio Equipment." E. W. Berth-Jones. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (S. Midland Radio Group).—"Electronic Telephone Exchanges." T. H. Flowers. James Watt Inst., Great Charles St., Birmingham, 6 p.m.

TUESDAY, JAN. 27

I.E.S. (Cardiff Centre).—"Stage-lighting." L. G. Applebee. S. Wales Elect. Board, 5.45 p.m.

I.E.S. (Liverpool Centre).—"Black Light—Effect and Application." H. L. Privett. Elect. Showrooms, Whitechapel, Liverpool, 6 p.m.

I.E.E. (N. Midland Centre).—Discussion on "Lighting and Illumination in Electrical Engineering Courses." E. C. Walton. College of Technology, Leeds, 6.30 p.m.

INST. OF FUEL.—"Efficiency of Domestic Space-heating Appliances using Solid Fuel." L. L. Fox. Instn. of Mechanical Engrs., Storey's Gate, S.W.1, 5.30 p.m.

BRITISH INSTN. OF RADIO ENGRS. (W. Midlands Section).—"Search for Bandwidth Economy in TV." D. A. Bell. Technical College, Wilfrume St., Wolverhampton, 7.15 p.m.

WEDNESDAY, JAN. 28

I.E.S. (London).—Trotter Paterson Memorial Lecture on "Nervous Reactions of Retina." Dr. E. D. Adrian. Royal Instn., Albemarle St., W.1, 6 p.m.

I.E.S. (Swansea Group).—"Coloured Directional Light as Applied to the Stage." L. G. Applebee. Minor Hall, Y.M.C.A., 6 p.m.

I.E.E. (London Supply Section).—"Some Researches on Circuit-Breaking by H.V. Circuit-Breakers, especially Current-Chopping." A. F. B. Young. Savoy Place, W.C.2, 5.30 p.m.

THURSDAY, JAN. 29

MERSEYSIDE ELECTRIC LIGHTING SERVICES CTEE.—"Research and the Lamp." Dr. J. N. Aldington. Philharmonic Hall, Liverpool.

I.E.S. (Bradford Group).—"Lighting for Celebrations." A. D. Charters. Y.E.B., 45-53 Sunbridge Rd., 7.30 p.m.

I.E.E. (S. Midland Centre).—Discussion on "Co-ordination of Technical and Practical Training." James Watt Inst., Great Charles St., Birmingham, 6 p.m.

I.E.E. (Swansea sub-centre).—Faraday lecture "Light from Dark Ages: Evolution of Electricity Supply." A. R. Cooper. Brangwyn Hall, Swansea, 6.30 p.m.

E.P.E.A. (S.W. Tech. Group).—"Supervisory Control." L. J. Day. Elect. House, Colston Ave., Bristol, 7.15 p.m.

FRIDAY, JAN. 30

I.E.S. (Birmingham Centre).—"Whither Lighting Design." A. J. P. Pashler and J. R. Anstey. Regent House, St. Philip's Place, Colmore Row, 6 p.m.

I.E.S. (Stoke-on-Trent Group).—Annual dinner.

E.P.E.A. (Southern Tech. Group).—"11 kV and 33 kV Overhead line Construction." N. G. Simpson. Municipal College, Bournemouth, 7 p.m.

EXHIBITION DIARY

Packaging. Third show opened at Olympia on Jan. 20, and closes on Jan. 30.

Amusement Trades. Ninth annual exbn. will take place at Old Royal Horticultural Hall, Westminster, between Jan. 27 and 29.

Hotel and Catering. Opens at City Hall, Deansgate, Manchester, on Feb. 4, continuing until Feb. 14.

Inventions and New Ideas. Opens on Feb. 18 at Central Hall, Westminster. Closes on Feb. 28.

Daily Mail Ideal Home. Opens on Mar. 3 at Olympia, London, and continues until Mar. 28.

Experience over 47 years

1952

Four 1500 kW. Hewittic Rectifiers for heavy traction service (British Columbia Electric Co.)

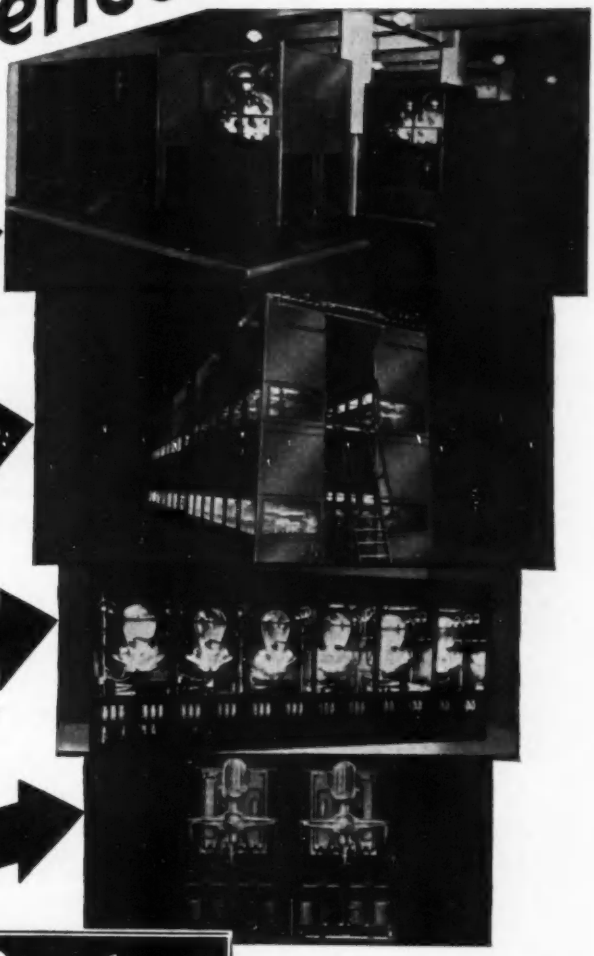
1940

Hewittic Rectifier, 8750 kW. in electrolytic service.

1932

1000 kW. 600 volt Hewittic traction Rectifier.

1905



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over 1¼ Million kW. in World-wide service

HACKBRIDGE AND HEWITTIC ELECTRIC CO., LIMITED
WALTON-ON-THAMES · SURREY · ENGLAND
Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric, Walton-on-Thames"

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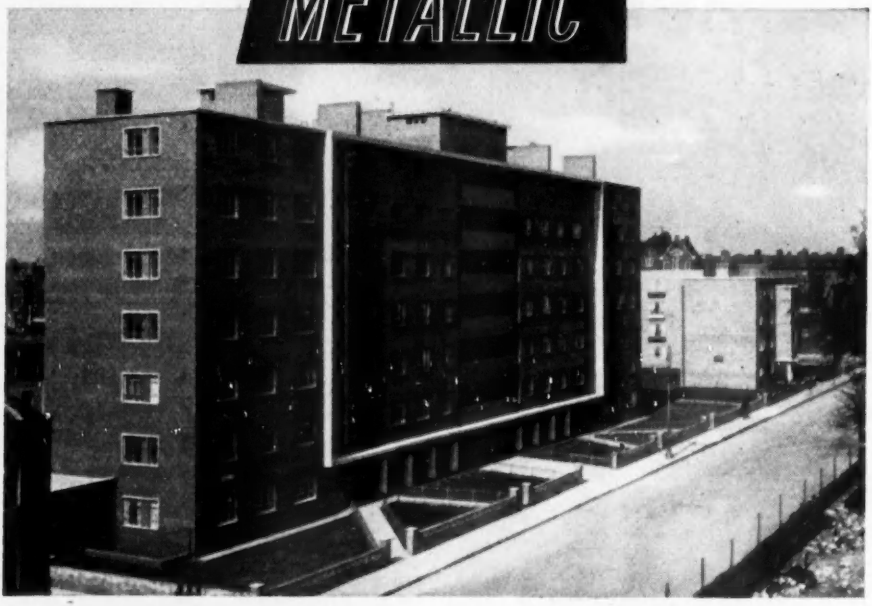


Godwin House, St. Marys Estate, Shoreditch.

(With acknowledgement to Shoreditch Borough Council and Iverson Electrical, Ltd.)

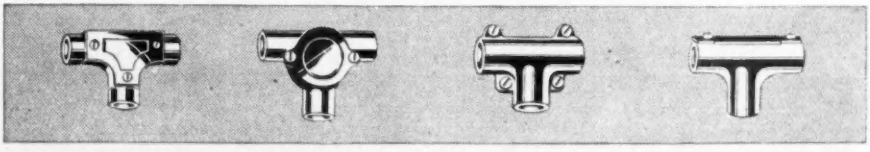
A TI COMPANY

It may be a school, it may be a factory—a power station or a housing estate, but more often than not the electrical specification will be—METALLIC.

This new block of flats is no exception, being fitted throughout with METALLIC conduit and fittings—unequalled for quality and consistent accuracy.

THE METALLIC SEAMLESS TUBE CO. LTD.

LUDGATE HILL • BIRMINGHAM • 3



ALSO AT LONDON · NEWCASTLE-ON-TYNE · LEEDS · SWANSEA & GLASGOW

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WORK WANTED WANTED · FOR SALE

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

PUBLIC NOTICES

METROPOLITAN BOROUGH OF WANDSWORTH

ELECTRICAL INSTALLATION

APPLICATIONS are invited from firms who wish to be placed on the council's list of electrical contractors who may be invited to submit quotations or tenders from time to time for the execution of the following electrical installation works:—

1. Works up to an estimated value of £500.
2. Works including power, over an estimated value of £500.

Firms already included on the council's list should submit a new application. Forms may be obtained from the Borough Engineer and must be returned to me by noon Feb. 18, 1953.

R. H. JERMAN,
Town Clerk.

Municipal Buildings,
Wandsworth, S.W.18. (C 459)

TENDERS INVITED

COUNTY BOROUGH OF DEWSBURY

Street Lighting Department

TENDERS are invited by the above Corporation for the supply of:—

No. 1 BIJOU MANTLES; ELECTRIC LAMPS, 230 V; ELECTRIC CABLE; 100/200-W LANTERNS, open refractor type; 300/500-W LANTERNS, open refractor type; swan-neck BRACKETS; swan-neck brackets, complete with CONTROL GEAR BOX; GAS LANTERNS; cast-iron and concrete LIGHTING STANDARDS; and Uniform OVERCOATS.

Form of tender, schedule and general conditions, and any further information can be obtained from C. H Midson, M.B.E., Street Lighting Engineer, 27 Battye Street, Dewsbury, Yorks, on receipt of a foolscap stamped and addressed envelope.

Tenders, enclosed in a plain, sealed envelope, endorsed "Tender for Electric Lamps" or any of the other specified materials, must be sent to me by noon on Thursday, February 26, 1953.

A. NORMAN JAMES,
Town Clerk.

Town Hall, Dewsbury.
January 16, 1953. (C 460)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY No. 6/53—STATION SHIFT CONTROL ENGINEER, Padiham Generating Station. Salary: £555-£569 (N.J.B. E.10).

Apply, quoting Vacancy No., to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before January 31. (C 420)

CROWN AGENTS FOR THE COLONIES

CHIEF X-RAY MAINTENANCE TECHNICIAN, Medical Department, required for the Gold Coast Local Civil Service for two tours each of 18 to 24 months in the first instance. Consolidated salary: £1,260, rising to £1,610 a year. Gratuity payable on satisfactory completion of final service at the rate of £37 10s. for every completed period of three months' service. Outfit allowance £60. Free passages. Liberal leave on full salary. Candidates must have served a regular apprenticeship to electrical engineering and have had considerable subsequent experience in the testing and repair of X-ray plant and electro-medical equipment.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.29758.B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (C 416)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointment:—

No. 6 (Hull) Sub-Area

SENIOR ASSISTANT ENGINEER
(Commercial).

Applicants, with technical experience, should be widely experienced in commercial matters, including the preparation of development programmes, negotiations with large consumers, and capable of co-ordinating the activities of sales, service centre and commercial engineering staffs in a sub-area.

Organising and administrative experience will be an advantage.

Salary: N.J.B., Class "J," Grade 4, £1,026-£1,071 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than February 5, 1953. (C 433)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

SHIFT CHARGE ENGINEER is required at Nechells "A" Power Station, Birmingham. N.J.B. service conditions; superannuable appointment; salary within Schedule "A," Grade G.7, commencing at £729 per annum. The station will shortly be reduced to Class "F."

Higher National Certificate in Electrical and/or Mechanical Engineering required, together with sound experience in the operation and maintenance of boilers and turbines, and e.h.t. switchgear.

Application forms available from the Establishments Officer, 53 Wake Green Road, Birmingham 13, to be returned by February 7, 1953. (C 442)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the appointment of PRINCIPAL ASSISTANT (STORES) in the No. 2 Sub-Area Accountant's Department, Eversley, Frodsham, Cheshire. Salary within the range £700-£775 per annum (N.J.C., Grade 6).

Applicants must be competent in the supervision of staff and organisation of work, and should have a thorough knowledge and practical experience of the operational control of stores and stores records.

The appointment is superannuable and subject to medical examination.

Application forms, obtainable from the Manager, No. 2 Sub-Area, Electricity House, Sandiway, near Northwich, Cheshire.

Closing date: February 3, 1953. Quote reference 102A. (C 431)

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF SECOND ASSISTANT ENGINEER
Commercial Department, No. 1 Sub-Area, Manchester

APPLICANTS should have wide experience in the control of electrical installation work, including the preparation of specifications, and in the general development of electricity sales to domestic and commercial users.

Corporate Membership of the Institution of Electrical Engineers will be an advantage.

Salary scale: £986/£1,017 p.a. Grade M.7. N.J.B. conditions.

Applications to Sub-Area Secretary, No. 1 Sub-Area, The North Western Electricity Board, Town Hall, Manchester, P.O. Box 493, by January 31, 1953.

APPOINTMENT OF:
(a) THIRD ASSISTANT ENGINEER
(b) GENERAL ASSISTANT ENGINEER
Mains Planning and Construction.
Sub-Area Headquarters, Blackburn.

Candidates should have had experience in the planning, construction and operation of industrial and rural H.V. and L.V. u/g. and o/h. networks and substations, and should be capable of estimating for and supervising the construction of such work. Construction and operating experience on 33 kV work will be an advantage.

Preference given to Corporate Members of the Institution of Electrical Engineers.

Salary scales: Post (a). £680/£706 p.a. Grade J.10. N.J.B. conditions. Post (b) £552/£573 p.a. Grade J.13. N.J.B. conditions.

APPOINTMENT OF SENIOR DEMONSTRATOR
Blackburn.

Applicants must have had a good education with training in domestic science, and should hold the E.A.W. Diploma. The person appointed will be required to give lectures and demonstrations on all types of domestic appliances, advise consumers on the choice of equipment, and must be capable of supervising staff and arranging the training and electrical education of new entrants up to E.A.W. Diploma standard.

Salary scale: £520/£580 p.a. Grade 3. N.J.C. conditions.

Applications for the above posts to Sub-Area Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee Street, Blackburn, by January 31, 1953. (C 432)

COUNTY BOROUGH OF SOUTHEND-ON-SEA

ASSISTANT ELECTRICAL AND MECHANICAL ENGINEER
Pier and Foreshore Department.

APPLICATIONS are invited for this appointment. Age limit 40 years (45 if already in Local Government Superannuation Scheme).

Salary: A.P.T., Grade II of the national scales (£495-£15-£540 p.a.). The appointment is terminable by one month's notice on either side.

Applicants should have served either an electrical or mechanical engineering apprenticeship, hold good technical qualifications, and have had general experience subsequently to apprenticeship, and be capable of undertaking the supervision (under the Chief Electrical and Mechanical Engineer) of the installation and maintenance of plant of the department, which includes traction system, maintenance of both rolling stock and permanent way, electrode boilers, water filtration plant, cranes, pumps, diesel electric dredger, large electrical installation, and water and gas services of the department.

Medical examination. Superannuation deductions. Uniform provided.

Application, stating age, full particulars of training and experience, accompanied by three testimonials, must reach the Piermaster and Foreshore Manager, Pier Hill Buildings, Southend-on-Sea, in a plain envelope endorsed "Assistant Engineer," not later than 9 a.m., Monday, February 16, 1953.

ARCHIBALD GLEN,
Town Clerk.
(C 415)

LONDON ELECTRICITY BOARD

JUNIOR ENGINEER (TEST)

APPLICATIONS are invited for the above position in the Meter and Testing Branch at Hampstead, N.W.3.

Applicants should have received a sound general and technical education at least to the Graduate I.E.E. standard. They should have completed an engineering apprenticeship with an electrical manufacturer or supply authority, and should have sound practical experience in three-phase h.v. and l.v. distribution.

The post is graded under the National Joint Board Agreement as Class "J," Grade 18, commencing salary £415 per annum inclusive, rising, in accordance with Clause 35, to Grade 14—£551 5s.-£572 5s. per annum, inclusive of London allowance.

Application forms obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned completed by January 31, 1953. Please enclose addressed foolscap envelope and quote Ref. V/1560/T. on all correspondence. (C 419)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS invited for the following appointments:—

Carrington (New) Generating Station.

Vacancy No. 1/53—SHIFT CHARGE ENGINEERS (5). Salary: £817-£852 (N.J.B. J.7).

Vacancy No. 2/53—SHIFT CONTROL ENGINEERS (5). Salary £680-£706 (N.J.B. J.10).

Sound operating experience in a modern steam station and technical education to at least Higher National Certificate standard are essential.

Vacancy No. 3/53—MAINTENANCE ENGINEER (MECHANICAL). Salary: £883-£918 (N.J.B. J.6).

Applicants must have served a bona fide apprenticeship and have had a sound practical and technical training. Experience essential of modern methods of supervision and the planned maintenance and overhauls of boiler, turbine and associated plant.

Agecroft (L.P.) Generating Station.

Vacancy No. 4/53—JUNIOR ENGINEER. Shift duties. Commencing salary: £390, rising to £466 (N.J.B. F.15/14).

No. 3 Sub-Division, Manchester.

Vacancy No. 5/53—GENERAL ASSISTANT ENGINEER. Salary: £501-£694 (N.J.B. AX/DX8)

Applicants should preferably hold H.N.C. (Mechanical) and have had experience of operation and testing of modern generating station plant.

Apply, quoting Vacancy No., to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before January 31. Housing accommodation may be available in respect of the vacancies at Carrington. (C 413)

HER MAJESTY'S COLONIAL SERVICE

APPLICATIONS are invited for the following posts:—

Vacancies exist in the Department of Broadcasting, Malaya, for (a) TWO TRANSMITTER ENGINEERS and (b) ONE STUDIO ENGINEER (27323/46). The duties of the posts are concerned with the supervision of installation, operation and maintenance of (a) medium-power short and medium wave transmitters and of (b) broadcasting studios and recording channels respectively.

Appointments are pensionable, on probation, in the salary scale £739-£1,680 per annum, with a pensionable expatriation allowance varying from £266-£364 per annum, the point of entry depending on experience and war service. In addition, there is a non-pensionable allowance for married candidates varying from £91-£259 per annum. A substantial variable cost-of-living allowance is also payable.

Free passages are provided on appointment and on leave for an officer, his wife and up to three children, under ten years. Furnished quarters, as available, are provided at reasonable rents. Leave is granted at the rate of four days for each month of resident service.

Candidates must be between the ages 25-35 years and have passed or be exempt from Sections "A" and "B" of the examination for Associate Membership of the Institution of Electrical Engineers, and should have had at least two years' experience with a broadcasting organisation or with a commercial firm manufacturing allied equipment.

Intending candidates should apply in writing to the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, S.W.1, giving brief details of their age, qualifications and experience. They should mention this paper and quote the reference number (27323/46). (C 418)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salary, inclusive of London Allowance, and conditions of service in accordance with N.J.B. Agreement, Schedule "A" or "C."

THIRD ASSISTANT ENGINEER (CONSTRUCTION)
Transmission Department, Divisional H.Q.

Applicants should be Corporate or Graduate Members of the I.E.E. or possess other equivalent qualifications, with experience in design, layout and site installation of high voltage substation equipment, together with knowledge of site testing and commissioning of substation plant. Salary, Class "AX," Grade 5, £681 9s. to £829 10s., rising to ultimate maximum, Class "EX," £927 3s. p.a.

JUNIOR ENGINEER (CONTROL ROOM)
Fulham Generating Station

Applicants should have had a sound engineering training with technical qualifications to at least Ordinary National Certificate standard, Electrical or Mechanical Engineering. Salary, Class "L," Grade 16, £552 6s. p.a.

Applications must be made on the form obtainable from Divisional Secretary, B.E.A. London Division, Generation House, Great Portland Street, W.1, and be received within 14 days of this advertisement. (C 445)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following posts in this Division:—

TESTING AND EFFICIENCY SECTION
(Generation Operation), Divisional Headquarters.
SECOND ASSISTANT ENGINEER
Vacancy No. 3/52

Applicants should have a good general and technical education, workshop experience, and a thorough knowledge and experience of the operation, testing and efficiency control of modern steam generating plant.

Preference will be given to candidates possessing a University degree, or equivalent, specialised knowledge on boiler combustion and cooling tower problems, and Corporate Membership of the Institution of Electrical Engineers or the Institution of Mechanical Engineers.

Salary for the above appointment will be within Schedule "C", Class "AX/DX", Grade 2 (£834 to £1,053 p.a.) of the National Joint Board Agreement.

THIRD ASSISTANT ENGINEER
Vacancy No. 4/53.

Applicants should have a good general and technical education to Higher National Certificate standard, workshop experience and a thorough knowledge and experience of operation and testing of modern steam generating plant, including instrumentation.

Preference will be given to candidates possessing an engineering degree, membership of the Institution of Electrical Engineers or the Institution of Mechanical Engineers, and specialised knowledge of boilers and associated plant.

Salary will be within Schedule "C", Class "AX/DX", Grade 5 (£649 to £858 p.a.) of the National Joint Board Agreement.

GENERAL ASSISTANT ENGINEER
Vacancy No. 5/53.

Applicants should have a good general and technical education to Higher National Certificate standard, workshop experience, and a good knowledge and experience of the operation and testing of modern steam generating plant, including instrumentation and automatic control systems, production of reports and records.

Salary will be within Schedule "C", Class "AX/DX", Grade 8 (£501 to £694 p.a.) of the National Joint Board Agreement.

TECHNICAL DEPARTMENT
Divisional Headquarters.
GENERAL ASSISTANT ENGINEER (PROTECTION)
Vacancy No. 6/53.

The minimum technical qualification required is the Higher National Certificate in Electrical Engineering. Preference will be given to candidates who have completed a recognised post-graduate apprenticeship, and experience of high voltage switchgear and protective gear will be an advantage.

The successful candidate will be employed as assistant to the Regional Engineer (Southern Group) and will be required to reside at or near Leicester or Coventry.

The salary will be within Schedule "C", Class "AX/DX" Grade 8 (£501 to £694 p.a.) of the National Joint Board Agreement. The commencing salary will depend upon qualifications and experience.

ASSISTANT SHIFT CHARGE ENGINEER
Spondon.
Vacancy No. 7/53.

Applicants should possess the Higher National Certificate, or its equivalent, and have had experience in a responsible position in a modern generating station.

The salary will be in accordance with Class "H", Grade 9 (£680 to £706 p.a.) of the National Joint Board Agreement.

GENERATION CONSTRUCTION DRAWING OFFICE
North Wilford Power Station, Nottingham.
(a) SECTION LEADER (ELECTRICAL)
Vacancy No. 8/53.
(b) SENIOR DRAUGHTSMEN (ELECTRICAL)
Vacancy No. 9/53.

Candidates for (a) should be capable of taking charge of a section consisting of senior and junior draughtsmen engaged upon the preparation of electrical projects for new power stations and extensions to existing power stations.

Candidates for (b) should have experience in the preparation of layouts and diagrams for the installation of e.h.t. and l.t. switchgear, transformers, e.h.t. and l.t. cables; knowledge of protective gear systems would be an advantage.

Preference will be given to candidates (for both the above positions) with technical qualifications equivalent to Higher National Certificate standard.

The salaries for the above appointments are: (a) Grade 3 Schedule "D" (£780 to £894 p.a.) and (b) Grade 4, Schedule "D" (£671 to £780) of the National Joint Board Agreement.

(*Continued in next column*)

(*Continued from previous column*)

CONSTRUCTION DEPARTMENT
Divisional Headquarters.
THREE SENIOR ASSISTANT ENGINEERS TO GROUP CONSTRUCTION ENGINEERS
Vacancy No. 10/53.

Preference will be given to candidates holding a degree in mechanical and electrical engineering, with experience in power station construction and operation.

Salary will be in accordance with Grade 1, Class "AX/DX", (£970 to £1,198 p.a.) of the National Joint Board Agreement.

The above posts will be pensionable within the provisions of the British Electricity and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned to the undersigned not later than February 9, 1953. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.
(C 444)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEER required in the Planning Section of the Chief Engineer's Department at Headquarters of the Board, Electricity House, Love Lane, Pall Mall, Liverpool 3, at a salary in accordance with Grade 8 of Schedule "C" of the N.J.B. Agreement, initially with a placing in Class "AX" within the range £501-£639, according to qualifications and experience, and subsequently according to the classification of the area at present Class "DX," £681-£694.

Applicants should have had a thorough technical training, possess qualifications to enable them to become Chartered Electrical Engineers and have knowledge of the economic factors governing the design and planning of distribution networks.

The appointment is superannuable and subject to medical examination.

Applications should be made on forms obtainable from the Establishments Officer at the above address and should be returned so as to be received before February 2, 1953. Quote reference 99A. (C 414)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

Vacancy No. 4/53.

APPLICATIONS invited for following superannuable N.J.B. appointments:—

(1) STATION CHEMIST, Newport Power Station. Salary: "F.7" (£697-£718 p.a.).

(2) GEN. ASST. ENGINEER, Transmission Department, Divisional H.Q. Salary: "AX/CX.8" (£501-£675 p.a.).

Desirable qualifications:—

(1) B.Sc. (Chem.) and/or A.R.I.C. and sound experience in water treatment, coal and oil testing and corrosion problems.

(2) H.N.C. (Elect.), recognised apprenticeship, and experience in construction of high-voltage sub-stations and overhead lines. Knowledge of 132 kV equipment an added advantage.

Application forms obtainable from Divisional Secretary, British Electricity Authority, South Wales Division, British Electricity House, Twyn-y-Fedwen Road, Cabalfa, Cardiff, should be returned by February 4, 1953. January 13, 1953. (C 412)

SOUTH WALES ELECTRICITY BOARD

REQUIRED, an ENGINEERING DRAUGHTSMAN in the Western Sub-Area of the Board at Tenby.

Salary in accordance with Grade 6 (£433-£567) of Schedule "D" of the N.J.B. Agreement.

Applications, stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary to arrive by January 31, 1953.

D. G. DODDS,
Secretary.
St. Mellons, Cardiff. (C 443)

ELECTRICAL POWER ENGINEERS' ASSOCIATION

NOTES TO MEMBERS

MEMBERS are urged NOT TO APPLY for positions advertised by the South Eastern Division of the British Electricity Authority at Littlebrook Power Station, other than the position of Station Chemist and the positions of Assistant Engineer (Handling) and Assistant Engineer (Handling-Shift).

Any Member applying for or accepting a position at Littlebrook Power Station, other than those named herein, will jeopardize the position of fellow Members already employed there. (C 457)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the following positions:—

THIRD ASSISTANT ENGINEER (STEAM)
Divisional Headquarters, Portsmouth
S/13.375

Applicants should possess a thorough knowledge of thermo-dynamics and be experienced in the determination of efficiency and losses occurring in large turbines and condensing plant. A sound knowledge of boiler testing is also required and applicants should be well acquainted with all instruments employed in this work. Plant operating experience will be an advantage. Preference will be given to those possessing qualifications admitting to corporate membership of a senior professional Institution.

Salary, N.J.B. "AX/CX 5," £649 to £835.

MAINTENANCE SUPERINTENDENT
Southampton Generating Station
S/13.361/2

Applicants must have had considerable experience of the maintenance of all generating station plant, including boiler plant, and the overhaul of large high-pressure turbines and associated equipment, alternators, h.t. and l.t. switchgear, transformers and circulating water plant. Preference will be given to corporate members of one of the senior professional engineering Institutions or candidates holding appropriate equivalent qualifications.

Salary, N.J.B. "F.6," £738 to £771.

ASSISTANT ENGINEER (EFFICIENCY)
Earley Generating Station, Reading
S/13.376

Applicants must have had considerable experience in the operation and testing of plant installed in a large modern generating station using pulverised fuel, and preference will be given to those possessing qualifications leading to corporate membership of a recognised professional Institution.

Salary, N.J.B. "G.7," £729 to £758.

Application forms, obtainable from P. D. A. Oliver, Esq., Divisional Secretary, British Electricity House, 111 High Street, Portsmouth, must be returned by February 4, 1953. (C 458)

SOUTH EASTERN ELECTRICITY BOARD

FOURTH ASSISTANT DISTRICT ENGINEER—
Croydon District

SALARY £548 to £565 p.a. plus London Weighting, under N.J.B. "F.11." Superannuable. Applicants should be suitably qualified and have practical experience in e.h.v. and l.v. three- and single-phase distribution.

Applications, giving two referees, on forms obtainable from H. Lowe, M.I.E.E., District Manager, SEEBoard, Electric House, Wellesley Road, Croydon, to be returned to him by February 4, 1953.

A. L. BURNELL,
Secretary.

January, 1953. (C 441)

MIDLANDS ELECTRICITY BOARD

SUB-AREA PURCHASING OFFICER

APPLICATIONS invited for above post at Worcester and District Sub-Area Headquarters. Electrical engineering background and knowledge of the markets in general electrical supplies, equipment and appliances, and of stock control desirable. Appropriate qualifications an advantage. Salary: £865-£970 per annum (N.J.C., Grade 8), superannuable.

Apply within 14 days, stating age, experience, present salary and position, to Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

A. STEPHENS,
Secretary.
(C 417)

COLNE VALLEY SEWERAGE BOARD

SHIFT ENGINEER required for permanent pensionable position on large modern sewage disposal plant. Duties include supervision of the power house containing six gas/Diesel-driven 750 kVA alternators and associated switchgear, centrifugal air compressors, pulverised fuel furnaces, vacuum filters, dry sludge extraction plant, pumping stations, etc. Salary £525 rising to £570 per annum. Housing accommodation at economic rent will be provided.

Applications, stating age, qualifications and experience, to Chief Engineer, Colne Valley Sewerage Board, Maple Lodge, Maple Cross, Rickmansworth, within 10 days of appearance of this advertisement. (C 464)

SOUTH WALES ELECTRICITY BOARD

REQUIRED, SURVEYOR in the Western Sub-Area of the Board at Tenby.

Salary in accordance with Grade 6 (£433-£567) of Schedule "D" of the N.J.B. Agreement.

Applications, stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary, to arrive by January 31 1953.

D. G. DODDS,
Secretary.
St. Mellons, Cardiff. (C 434)

A CABLE COMPANY requires an experienced BUYER with some knowledge of non-ferrous metal markets and the purchasing of engineering stores. A public school or equivalent education desirable. The appointment is pensionable and will carry a good salary. Replies will be treated in the strictest confidence and interviews arranged for the convenience of applicants, who should state detailed experience in chronological order, salaries earned and required.—Replies to Box No. 2343, Electrical Times. (C 461)

A. REYROLLE & CO., LTD., have vacancies for CONTRACTS ENGINEERS at Hebburn for both home and export work with opportunities for appointment overseas. The work combines technical and commercial activities on switchgear for all voltages and offers considerable scope.—Applicants should write, giving details of their technical qualifications and experience, together with the salary required to the Contracts Manager, A. Reyrolle & Co., Ltd., Hebburn, Co. Durham. (C 275)

ASSISTANT ELECTRICAL ENGINEER is required for chemical company in the Midlands. Duties will include preparation of schemes, general layouts and design, and overall supervision of electrical plant. A fully experienced and qualified man is required. The post is permanent and pensionable.—Please state fullest particulars in confidence, quoting Reference No. EL.19, to Box No. 2333, Electrical Times. (C 421)

ASSISTANT ELECTRICAL ENGINEER required for Manchester office of London firm of Consulting Engineers. Candidates must have technical training to Grad. I.E.E. standard and some practical experience with high voltage switchgear, transformers and protection up to 132 kV, preferably through an apprenticeship course with leading manufacturer. Salary £480 to £650 per annum, according to qualifications and experience. —Details to Reference M.V.R., Kennedy and Donkin, 12 Caxton Street, Westminster, S.W.1. (C 446)

ASSISTANT OVERHEAD LINE ENGINEER wanted by Consulting Engineers for supervising construction work in Manchester or Birmingham areas. Candidates must have previous experience in the survey and construction of steel tower overhead transmission lines up to 132 kV. Possession of a university degree an advantage. Salary £550 to £900 per annum, according to qualifications and experience.—Details to Reference M.V.R., Kennedy and Donkin, 12 Caxton Street, Westminster, S.W.1. (C 447)

BRITISH ELECTRICITY AUTHORITY require PRINCIPAL ASSISTANT—Internal Audit at Kingston-upon-Thames (South Eastern Division). Salary, N.J.C. Grade 9, £970 to £1,090. Pension scheme. Candidates should have recognised accountancy qualification and some experience of internal audit. Knowledge of Electricity Supply Industry would be an advantage.—Applications, stating age, present salary, training, qualifications and experience, to D. Moffat, Director of Establishments, British Electricity House, Wilneley Street, London W.1, by February 9, 1953. Quote Ref. AE.315. (C 449)

CABLE laying and installation CONTRACTS ENGINEER, experienced in price estimating, supervision of site work, including jointing and labour, required for responsible position offering scope for advancement.—Applications, with full details of education, training and subsequent experience, with appropriate dates, to Box No. 2317, Electrical Times. (C 377)

DRAUGHTSMAN (MECHANICAL) required for interesting work in engineering services in large factory. Experience desirable in planning of one of following factory services: steam, water and hydraulics, compressed air and gas, heating and ventilating. Senior and junior appointments intended. Senior post will involve technical control of projects from estimate stage to final commissioning of plant. Age limit under 29. Pension scheme.—Applications, stating full personal details, industrial experience and salary required, to Personnel Manager, Ferodo Ltd., Chapel-en-le-Frith, via Stockport, Cheshire. (C 425)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

DE HAVILLAND

Advanced Guided Weapon · Projects

Technicians are needed for key positions in an expanding team engaged on research, design and development work. Permanent and progressive posts, both senior and junior, are available for men of ability and enthusiasm who can offer sound knowledge and experience. This is a unique opportunity of acquiring advanced techniques and promotion prospects are good.

Reference:

17 DESIGNERS experienced in servo mechanisms, gyros, hydraulics, pneumatics, materials and structures related to aircraft or armament work.

17A DRAUGHTSMEN—SENIOR, INTERMEDIATE and JUNIOR for varied aspects of design.

18 MATHEMATICIAN for work on control systems. Knowledge statistics and noise. First-class honours or higher degree.

19 PHYSICISTS—SENIOR—for research team. With honours degree and industrial experience.

20 PHYSICISTS as research workers for field and laboratory tests, with good degree and some industrial experience in electronics or specialising in mathematics.

21 ELECTRONIC ENGINEERS — SENIOR — to be responsible for section engaged in work as reference 22 below.

22 ELECTRONIC ENGINEERS experienced in one or more of following—circuit development, miniature and sub-miniature techniques, magnetic amplifiers and equipment.

23 DEVELOPMENT ENGINEERS, H.N.C. standard, experienced structural testing (preferably aircraft), knowledge of strain-gauge equipment an advantage. Capable of working on own initiative planning test equipment and analysing test results.

24 DEVELOPMENT ENGINEERS, H.N.C. standard, familiar small electro-mechanical equipment, pneumatic and hydraulic servo systems for testing and developing. Knowledge electronic test equipment a distinct advantage. Should have experience in undertaking planning, carrying out and analysing of complete tasks.

26 INSTRUMENT ENGINEERS—experience of electro-mechanical instruments (gyros, small specialised motors, relays, etc.).

27 SERVO ENGINEERS—practical experience of servo mechanisms.

28 LABORATORY ASSISTANTS, qualified H.N.C. City and Guilds standard, for varied work.

29 WIREMEN—advanced laboratory standard.

30 WIREMEN—familiar circuit diagrams, radio or radar maintenance experience. Young ex-Servicemen particularly invited to apply.

31 TRIALS ASSISTANT—experience as reference 30 above.

Apply in confidence quoting reference number of post in which interested to:

The Personnel Manager,

DE HAVILLAND PROPELLERS LTD.

Hatfield · Hertfordshire.

DORMAN LONG & Co. Ltd.

in view of their major plant developments, require the services of electrical staff. Experience of rolling mills, coke ovens and blast furnace plant, etc. an advantage but not essential.

(a) **SENIOR ASSISTANT ELECTRICAL ENGINEERS,** preferably having design, layout and installation experience on heavy electrical plant. Corporate membership of I.E.E. desirable.

(b) **JUNIOR ASSISTANT ELECTRICAL ENGINEERS,** Higher National Certificate qualification desirable.

(c) **METERING AND PROTECTION ELECTRICAL ENGINEER.** Corporate membership of I.E.E. desirable.

(d) **ELECTRICAL DRAUGHTSMEN,** experienced on distribution, control and lighting schemes.

Applications, stating full particulars of experience, qualifications, age, etc. and salary required, to be forwarded to

THE CHIEF ELECTRICAL ENGINEER, DORMAN LONG & COMPANY LIMITED, G.P.O. BOX 11, ROYAL EXCHANGE, MIDDLESBROUGH, Marked "PERSONAL".

(C424 p)

C.M.A. Cable Manufacturers require experienced REPRESENTATIVE for the sale of rubber cables in the London area. Must have good technical knowledge as well as sales experience.—Please reply in confidence, giving full details to Box No. 2339, Electrical Times. (C 450)

DRAUGHTSMEN. Ewbank and Partners, Ltd., have vacancies for Mechanical Engineering Draughtsmen experienced in power station design layout, pipework layout, circulating water systems, with some knowledge of coal and ash-handling plant. The positions are permanent and pensionable, free lunches are provided and a five-day week is in operation.—Applicants should write in the first instance, stating age, details of experience and salary required, to the Secretary, Ewbank and Partners, Ltd., Engineering Consultants, 10/11 Grosvenor Place, London S.W.1. (C 364)

ELECTRICAL DRAUGHTSMAN required by Glasgow firm of engineers.—Written applications desired in the first instance outlining technical education (which should be to at least O.N.C. standard), experience and salary required.—Write 1511, Wm. Porteous & Co., Glasgow. (C 451)

FOREMAN for repair shop. Must be familiar with rewinds up to 500 h.p., static and rotary, and capable of handling mixed labour—Apply, giving full details, to Simpson Bros. (of Hapton) Ltd., Hapton. (C 436)

JOHNSON AND PHILLIPS LTD. require a CHIEF SWITCHGEAR DRAUGHTSMAN for SOUTH AFRICA. Candidates must have good practical and technical training in addition to experience with leading manufacturers, both in drawing and design offices, and preferably be between 30 and 40 years of age.—Applications in writing, giving full particulars of training, experience, age and salary required, to Employment and Welfare Manager, Johnson and Phillips Ltd., Victoria Works, Charlton, S.E.7. (C 463)

JUNIOR DISTRIBUTION ENGINEER required by consulting engineers in their London office. Applicants should have received a suitable technical education and preferably have some knowledge of the construction of h.v. and l.v. overhead distribution systems. Salary £400 to £550 according to qualifications and experience. —Applications, stating age, qualifications and experience should be sent to Ref. CEM. Messrs. Kennedy & Donkin 12 Caxton Street, London S.W.1. (C 453)

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

HYDRO-MECHANICS and ELECTROSTATICS. The Dowsett Civil Engineering and Shipbuilding Companies invite applications from suitably qualified ENGINEERS for a special technical appointment. Essential qualifications:—

(i) Honours degree or equivalent in mathematics, with natural aptitude and inclination towards applied mechanics and hydraulic engineering, together with a full theoretical grounding in the principles and applications of electrostatic precipitation and separation of small particles.

(ii) A satisfactory period of practical training and experience before or after the university course is required, although not necessarily in exact relation to the particular subjects provided such practical training has been carried out with an industrial or scientific organisation of high reputation.

(iii) The position is permanent, carrying most substantial prospects for a man capable of carrying through a planned development from design and drawing-office stages to practical construction and operation.

(iv) Applicants must initially be free to reside at any location in the British Isles and afterwards to proceed overseas to Australasia for such time as may be considered necessary. They should be of sound physique with a temperament capable of enjoying hard work under rigorous conditions in creative enterprise.

Maximum age limit positively 35. Very generous remuneration dependent on experience and ability. Latest commencing date, March 31, 1953.—Applications, which will be treated in strict confidence, giving all personal particulars, full details of past and present employment and stating positions held and salaries received, should be addressed for the personal attention of the Managing Director, Dowsett Group of Companies, Tallington, Stamford, Lincolnshire. (C 462)

JOHNSON & PHILLIPS require a DRAUGHTSMAN for their Capacitor Department. Preference will be given to applicants having experience in capacitor work. —Applicants should be between the age of 22 and 26, and should state age, training, experience and salary required in writing to Employment & Welfare Manager, Johnson & Phillips, Ltd., Victoria Works, Charlton, S.E.7. (C 283)

ELECTRICAL DESIGNER DRAUGHTSMEN

required by London office of leading consulting engineers to the oil industry. Technical education to at least O.N.C. standard and some experience of lighting and power layouts for oil refinery, chemical or similar plants are essential qualifications. Excellent working conditions, above average salaries and pension benefits are offered to capable men.—Apply, in writing, to **Personnel Manager, Kellogg International Corporation, 7/8 Chandos Street, London W.1.** (C 411p)

IMPERIAL CHEMICAL INDUSTRIES LTD., General Chemicals Division, invite applications for the following vacancies:—

SENIOR ASSISTANT ENGINEER (GENERATION), P/1

Applications are invited for the position of additional senior assistant engineer in the Generation Section of the company's Power Department, Runcorn, Cheshire. The duties are to assist, under the direction of the Generation Section manager in the headquarters of the department with the operation and maintenance of the division's power stations, which have an installed capacity of more than 100,000 kW and with the design of extensions thereto. Applicants, who should be between the ages of 30 and 38 years, and should hold a degree in mechanical or electrical engineering, must have had a sound mechanical engineering training and should have had considerable experience of the operation and maintenance of large modern high-pressure steam power stations. In addition they should have had some experience of the preparation of designs and specifications for new plant and of investigations and tests in connection therewith, while Corporate Membership of either the Institution of Mechanical Engineers or the Institution of Electrical Engineers is also desirable. Commencing salary, up to £1,250. The selected candidate will be required to pass a medical examination and to join the company's pension fund.

SENIOR ASSISTANT ENGINEER (MECHANICAL), P/2

Applications are invited for the position of additional senior assistant engineer in the Mechanical Section of the company's Power Department, Runcorn, Cheshire. The duties are to assist, under the direction of the Mechanical Section manager in the headquarters of the department, with the maintenance of the mechanical equipment of the division's power stations, which have an installed capacity of more than 100,000 kW and with the design of extensions thereto. Applicants, who should be between the ages of 30 and 38 years, and should hold a degree in mechanical engineering, must have had a sound mechanical engineering training and should have had considerable experience of the maintenance and design of the mechanical equipment of large modern steam power stations. In addition, they should have had some experience of the preparation of designs and specifications for new plant and investigations and tests in connection therewith, while Corporate Membership of the Institution of Mechanical Engineers is also desirable. Commencing salary up to £1,150. The selected candidate will be required to pass a medical examination and to join the company's pension fund.

Applications in writing, giving age and full particulars of education, technical qualifications, engineering training and power station experience, should be sent to the Staff Manager, Imperial Chemical Industries Ltd., General Chemicals Division, Cunard Building, Liverpool 3, quoting reference P/1 or P/2 as appropriate. (C 437)

LONDON TRANSFORMER PRODUCTS LTD., Bridgend, Glamorgan, require an experienced DRAUGHTSMAN fully conversant with the manufacture of power transformers up to 2,500 kVA, 33 kV. A modern house can be made available for a successful married applicant. —Reply, giving full details of age, experience and salary required, to "The Chief Draughtsman." (C 365)

MECHANICAL MAINTENANCE ENGINEER wanted for large industrial power plant equipped with h.p. water-tube boilers, turbines and modern auxiliaries. Applicants must have some years' practical experience with this type of power plant backed up with technical knowledge up to H.N.C. standard or its equivalent. Age not less than 32 or more than 45. Non-contributory pension scheme. Commencing salary £950. Position offers good prospects for a suitable man.—Reply to Box No. 2323, Electrical Times, quoting reference TME/4. (C 396)

OPPORTUNITIES available to young men with good university degrees. Applicants, preferably with some industrial experience, but must have antitude to eventually assume responsible posts in one of the many spheres associated with growing switchgear manufacturing organisation.—Full particulars of past experience, qualifications, etc., to Box No. 2327, Electrical Times. (C 406)

PAKISTAN. Applications, preferably from single men aged 28-40 years, are invited by an old-established cable company, for a position of MANAGER AND ENGINEER of their local selling company in Karachi. Duties will include periodic visits to the company's agents in India to give collaborative assistance. Applicants should be suitably qualified by technical training and have electrical engineering experience, which must include transmission and distribution. Initiative for sales development and some commercial knowledge required. —Details of qualifications, experience and salary expected to Box No. 2329, Electrical Times. (C 407)

REVO ELECTRIC CO., LTD., require a REPRESENTATIVE with previous sales experience with manufacturers for the sale of cookers, street lighting equipment, appliances, and industrial fittings, for the Essex-Hertfordshire, North London, and a small part of Bedfordshire and Buckinghamshire, area. Resident in area and car owner. 30 Gt. Queen Street, London W.C.2. (C 397)

JOHNSON & PHILLIPS LTD.

OVERSEAS APPOINTMENT FOR SWITCHGEAR ENGINEER

REQUIRED to develop switchgear manufacture in an existing factory in India. Applicants must be fully conversant with the manufacture and assembly of switchgear up to 11,000 V, and be competent to plan complete switchgear installations. The immediate problem is the design and construction of switchboards using imported circuit breakers and components.

The appointment is a senior one offering scope for initiative and opening for advancement. Salary will be at a generous level. Suitable provisions for retirement are available. Normal home and local leave arrangements.

Applicants should preferably be 28 to 40 years of age.

Applications, which will be treated in strict confidence, should be addressed to:—

The Managing Director,
JOHNSON & PHILLIPS LTD.
Victoria Way, Charlton, London, S.E.7
(C 435p)

SENIOR OVERHEAD LINE ENGINEER wanted for Consulting Engineers' Weybridge office. Candidates must have a University Degree in Engineering and have good experience in the design and construction of steel tower overhead transmission lines up to 132 kV. Salary £900 to £1,500.—Details to Reference M.V.R., Kennedy and Donkin, 12 Caxton Street, Westminster, S.W.1. (C 454)

SERVICE CENTRE ASSISTANT (male) required at Leominster. Salary £160-£450 per annum, according to age and ability.—Apply, in writing, to Sub-Area Manager, Midlands Electricity Board, Spring Gardens, Ditherington, Shrewsbury. (C 422)

SITE ELECTRICAL ENGINEER required by a major industrial concern to act in a supervisory capacity on sites in London and the provinces, and should therefore be prepared to travel. Applicants will be engaged on the new projects and should have full experience in the installation of electrical services, both high tension and low tension, in factories, and should be conversant with all forms of motor control and contactor relays; also automatic controls, including testing.—Write, giving details of age, experience and salary required, to Box T.4116, A.K. Advg., 212a Shaftesbury Avenue, W.C.2. (C 423)

STAFF FOREMAN required immediately by City contractors. Ability to handle small works from estimating to final account stages and thorough knowledge of a.c. and d.c. power work are essential. Good salary and car allowance.—Full details to Box No. 2341, Electrical Times. (C 455)

TECHNICAL ENGINEER (Electrical) required by Glasgow firm of manufacturing engineers for design and development work on an important new project. Applicants should be honours graduates in electrical engineering with a few years post graduate industrial experience. Written applications are desired in the first instance outlining technical education, qualifications and experience and approximate starting salary required A superannuation scheme is operated.—Write 1510, Wm. Porteous & Co., Glasgow. (C 452)

TECHNICAL SALES CORRESPONDENTS are required by Sangamo Weston Ltd. in their Weston Instrument Section. Applicants should preferably have had previous engineering and commercial experience in connection with electrical measuring instruments, but those similarly employed in some other branch of the light electrical engineering industry will be considered. Age desirably 25-35 years. These positions offer plenty of scope for men who are technically qualified and who also have a real interest in the commercial side of "sales."—Applications, all of which will be acknowledged, should be addressed to The Employment Manager at Gt. Cambridge Road, Enfield, Middlesex. (C 395)

TRANSMISSION LINE CONSTRUCTIONAL ENGINEER is required by old-established British cable company for service in India and Pakistan. Applicants should have had an electrical training and at least five years' experience in charge of the construction of steel tower lines for working voltages of 66 kV and over. The salary will be according to experience and qualifications and the terms and conditions of the appointment will be discussed with applicants who are invited to an interview in London. Applications (stating age) should include full details of education, qualifications, training and experience.—Box No. 2297, Electrical Times. (C 321)

APPOINTMENTS WANTED

ADVERTISER (31) seeks progressive post, London area. Experienced in stock control, stores accountancy, buying and selling, etc. Will accept anything.—Box No. 2291, Electrical Times. (C 284)

SALES MANAGER, A.M.I.E.E., A.M.I.P.E., A.S.M.A., seeks appointment offering increased scope. First-class technical, commercial experience and sales record. —Box No. 2307, Electrical Times. (C 341)

WORK WANTED

A.C. and d.c. MOTOR REWINDS and REPAIRS. Prompt service fully guaranteed. Edgware 5566 (4 lines). —Service Electric Co., Ltd., Stanmore, Middx. (C 16)

ELECTRIC motors, stators, etc., REPAIRED AND REWOUND. Vacuum cleaner and electric tools rewound. Seven-day service.—Motor Winding Co., 18 Gipsy Hill, London S.E.19 (Gipsy Hill 0354). (C 33)

PROFILE CUTTING, accuracy assured, latest "Hancock" machines. Contract or job. Templates made if required.—R. F. Fielding and Co., Myrtle Farm Works, Erith, Kent (Erith 2635). (C 456)

WIREWORK inquiries invited. Guards, screens, partitions, baskets, trays, panels, machinery and window guards, etc.—Wire Products (Denton), 96 Town Lane, Denton, Lancs. Tel.: Denton 2470, 3901/2. (C 352)

WIREWORK inquiries invited. Guards, screens, partitions, baskets, trays, panels, machinery and window guards, etc.—Wire Products (Denton), 96 Town Lane, Denton, Lancs. Tel.: Denton 2470, 3901/2. (C 353)

BUSINESS OPPORTUNITIES

CANADA

FIRMS who have well considered plans for starting or expanding manufacture in Canada, and who require financial assistance, are invited to contact an important London Banking House.

All communications, including any initial enquiries, should be in writing, addressed to

"Canada," c/o Slaughter & May
18 Austin Friars, London, E.C.2
(C 426p)

WANTED

A.C.-D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co. Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (C 10)

LIGHTING SETS and small ALTERNATORS wanted, 230/1/50.—Hill, 200 High Street, Exeter. (C 438)

RECTIFIERS, PLATING RECTIFIERS REQUIRED giving total of 3,000 amp at 6 to 10 V.—Metanodic Engineers, Ltd., Pool Dam Works, Newcastle, Staffs. Tel. 66358/9. (C 404)

WANTED. D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co. Ltd., 22-26 Britannia Walk, London N.1. (C 6)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady Street, Bethnal Green, E.1. (C 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock water tube boilers. Best prices paid. Prepared to purchase Babcock and Wilcox water-tube boilers for dismantling. —Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath, Staffs. (C 2)

WANTED. ROTARY CONVERTERS, any size.—Universall, 221 City Road, London E.C.1. (C 8)

FOR SALE

GENERATING PLANT

ONE complete 394 kW BRUSH ALTERNATING SET with overhung excitor supplying 440 V, 3 phase, 50 cycles. Direct coupled to a Petter Superscavenge diesel engine, 540 b.h.p. at 600 r.p.m. Set complete with oil fuel tanks and piping, separate compressed-air starting set, cooler, switchgear, panels and spares.—Box No. 2335, Electrical Times. (C 427)

SPECIAL PLANT. Three Babcock and Wilcox BOILERS, each approx. 25,000 lb evap., 200 lb pressure, for saturated steam, with economisers, chain grate stokers, two boiler feed pumps, Hopkinson fittings.

250 kW steam engine driven GENERATOR SET, 400 V d.c., 3-wire, 625 amps, 375 r.p.m., with 365 b.h.p. Belliss and Morcom engine. Steam pressure 180/195 lb sq in., exhausting to 60 lb back pressure, with oil-free exhaust. Cylinders 11 in. by 11 in. by 9 in.

250 kW steam-driven GENERATOR SET, 400 V d.c., 3-wire, 625 amps, 375 r.p.m. Direct-driven by 365 h.p. Belliss and Morcom compound steam engine No.- 6203. Steam 160 lb sq in., exhausting to 26 in. vacuum, and subject to valve setting, could be modified for 160 lb sq in., and back pressure up to 10/20 lb. At present installed with surface condenser by Belliss and Morcom, with circulating pump and Edwards extraction pump.

Vert. steam-driven Sentinel AIR COMPRESSOR by Alley McLellan. Series 140, size B. Rated 250 c.f.m., 100 lb W.P., when supplied with steam 60 lb sq in.

Vert. steam-driven Sentinel AIR COMPRESSOR by Alley McLellan. Series 23C, size 7. 500 c.f.m., 100 lb W.P., with steam 200 lb sq in., exhausting at 60 lb.

1,000 kW turbo ALTERNATOR SET by Westinghouse. 400/440/3/50. Steam pressure 200 lb sq in. 3,000 r.p.m. Exhausting to surface condenser.

George Cohen, Sons and Co., Ltd., Wood Lane, London W.12 (Tel.: Shepherds Bush 2070). And Stanningley, near Leeds (Tel.: Pudsey 2241. (C 440)

TWO Mirrlees Brush diesel ALTERNATING SETS, comprising J4., 280 b.h.p., 750 r.p.m. engine, direct coupled to Brush 192 kW (240 kVA), 400 V/3/50 c/s, 4-wire alternator, with Heenan and Froude coolers. Switchboard with paralleling equipment. Brand new and unused.—Full details Box No. 2337, Electrical Times. (C 428)

GENERATING PLANT

TENDERS are invited for the purchase of the following GENERATING PLANT, situated at our Hotel, Parknasilla, Co. Kerry:—

ONE—horizontal, single-cylinder, class M, size 5 Ruston & Hornsby 16 b.h.p. (approx.) oil engine with twin flywheels, together with all accessories, including fuel tank and a quantity of spares, but excluding any cooling tanks.

ONE—7½ kW 120/140 V d.c. compound-wound Newton manufacture belt-driven Generator.

The plant is in perfect mechanical order and may be seen at the hotel by arrangement with the Signal and Electrical Engineer, Inchicore, Dublin (Tel. 52355).

Tender forms and conditions of sale may be had on application to Stores Superintendent, C.I.E., Inchicore, Dublin (Tel. 52355). Completed tenders are to be returned to the Secretary, C.I.E., Kingsbridge, so as to reach him not later than Wednesday, February 25, 1953.

CORAS IOMPAIR EIREANN
(C 439p)

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All types and sizes of

Industrial Electrical Equipment

ELECTROPOWER COMPANY LIMITED
Kingsbury Works, Kingsbury Road, London N.W.9
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A.A. ELECTRICAL CO. FOR A.C.D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Chiswick 5605, 67 Rothschild Road, W.4. (C 9)

A.C. and D.C. MOTORS, all sizes, large stocks. Fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22. (Forest Hill 2278-9). (C 4)

A.C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 5566-9. (C 11)

LIGHTING EQUIPMENT

PURLEY CHOKES AND BALLASTS. Our 80 W tapped h.p.f. ballast, with starter switchgear-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each, subject.—F. W. Blanshard Ltd. (Dept. E.T.), Purley, Surrey. Uplands 4818-9 (C 17)

METERS

A.C.D.C. QUARTERLY and SLOT METERS.—Brent Electrical Co., 6 Holmdale Gardens, London, N.W.4. (C 7)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 12)

FOR ELECTRICAL MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 98 East Ordsall Lane, Salford 5. (C 14)

GEARED MOTORS, new, 1¼ stock. From 1 r.p.m. to 4 h.p. spur or worm gears by well-known makers.—Super Power Ltd., 81 North Side, Clapham Common, S.W.4. Battersea 3355. (C 429)

REDUCTION GEARED MOTORS, ¼ h.p., 230/150, 1,425 r.p.m., by L.D.C., with Oppermann gearbox, final speed 50 r.p.m.; 14 for immediate delivery; £15 each.—Power Motor Rewind and Repair Co., Spurgeon Street, Colchester (Tel. 5377). (C 430)

SWITCHGEAR

MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London N.22. Tel.: Bow 7221. (C 13)

MISCELLANEOUS

CITY AND GUILDS (Electrical, etc.) on "No Pass—No Fee" terms. Over 95 per cent. successes.—For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook. FREE and post free.—B.I.E.T. (Dept. 39), 17 Stratford Place, London W.1. (C 239)

FREE! Brochure giving details of courses in ELECTRICAL ENGINEERING and ELECTRONICS, covering A.M.Brit.I.R.E., City and Guilds, etc. Train with the Postal Training College operated by an Industrial Organisation. Moderate fees.—E.M.I. Institutes, Postal Division, Dept. ET29, 43 Grove Park Road, London W.4. (Associate of H.M.V.) (C 240)

THE PROPRIETOR of British Patents Nos. 611697 and 611698 entitled "ELECTROMAGNETIC RELAY" and "ELECTROMAGNETIC RELAY" respectively, offers same for licence or otherwise to ensure practical working in Great Britain.—Inquiries to Singer, Stern and Carlberg, 14 East Jackson Boulevard, Chicago 4, Illinois, U.S.A. (C 356)

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with confidence, as only OKERIN Waxes are used.

Yours faithfully,

J. Power Factor

P.S. Waxes are small in bulk, but bulk large in importance, - they must be just right for the job, and reliable. Always Specify OKERIN.

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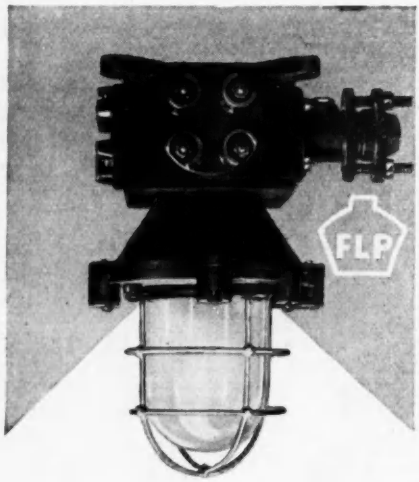

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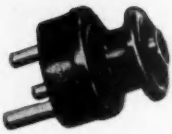

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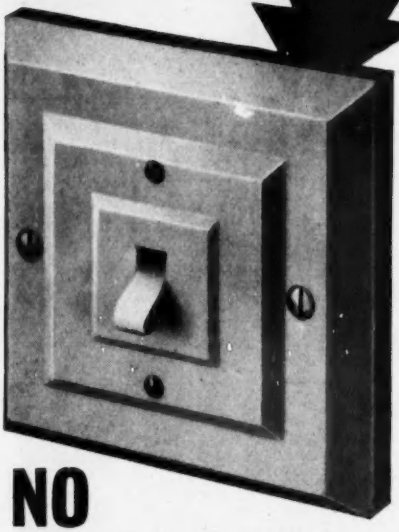

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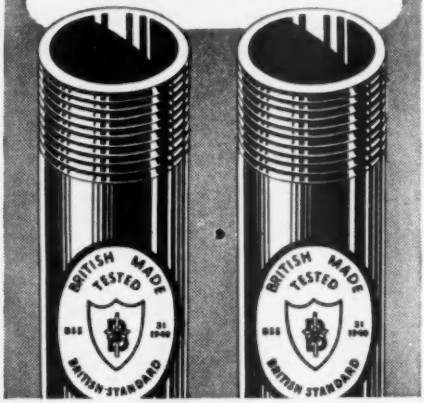

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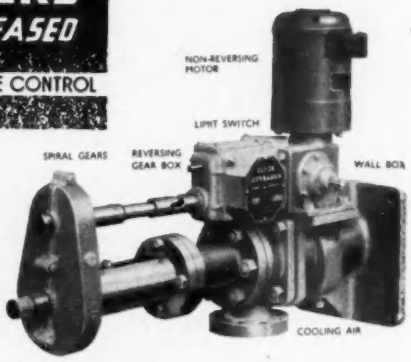

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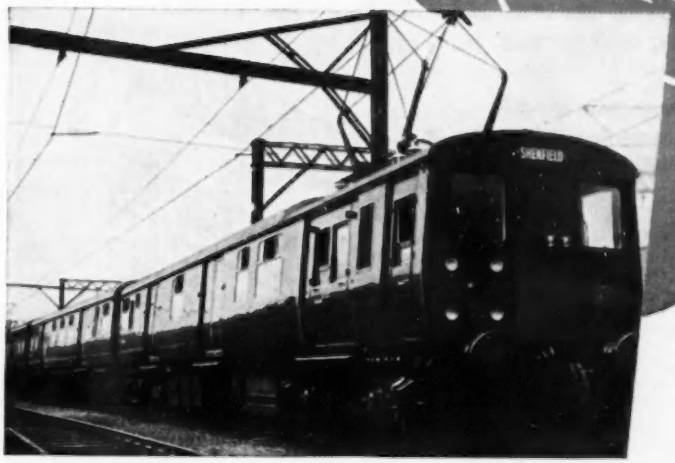

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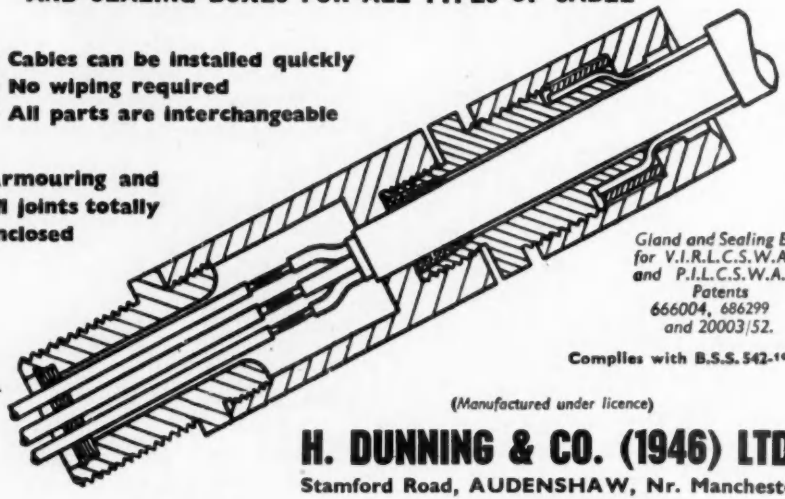

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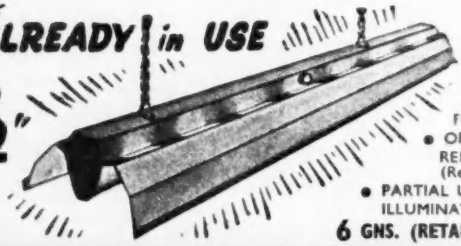

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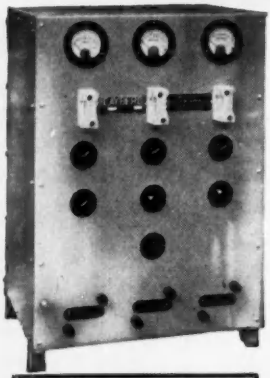

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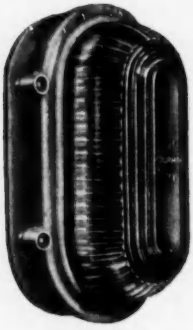

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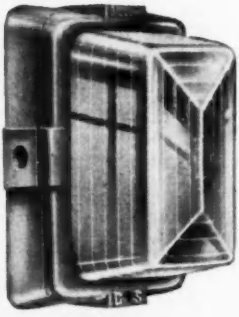

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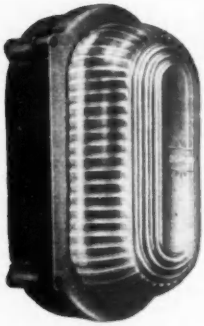

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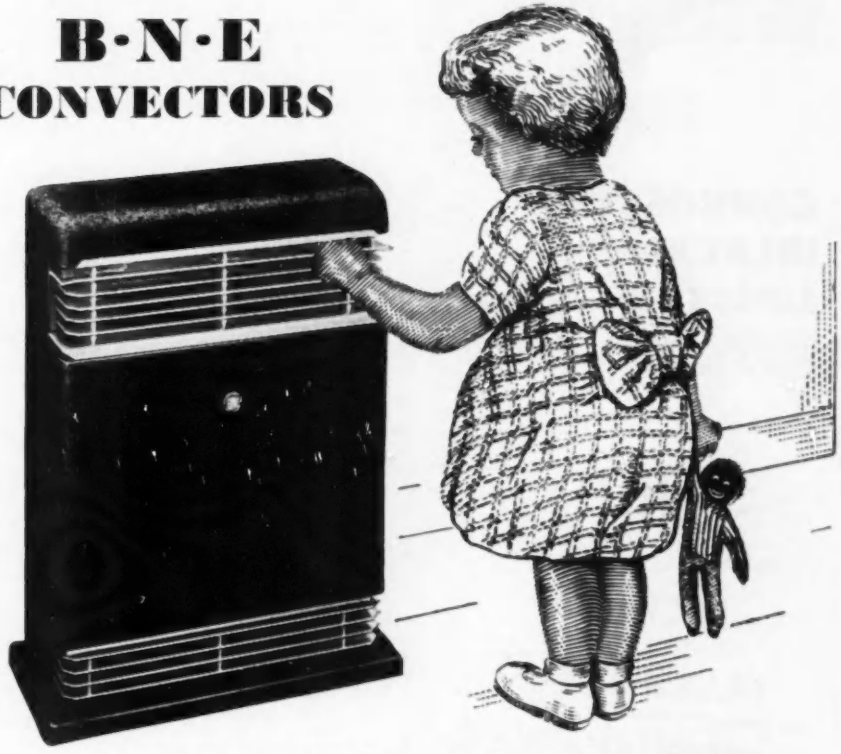

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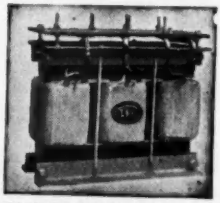

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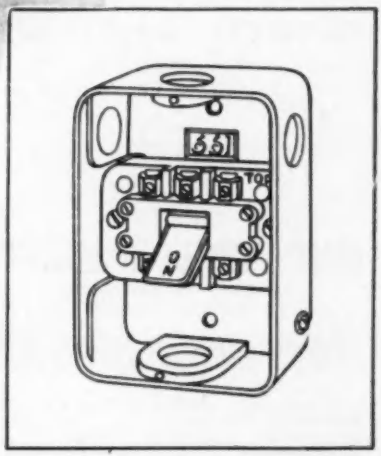

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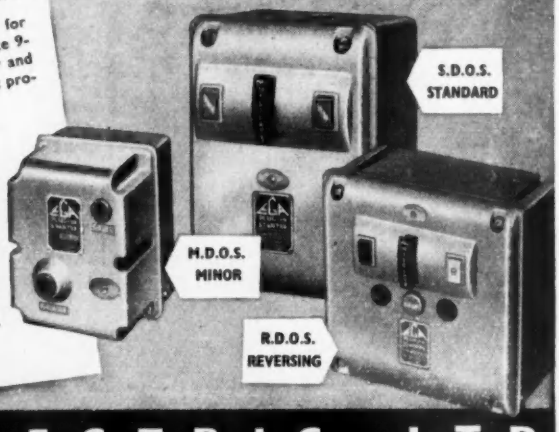

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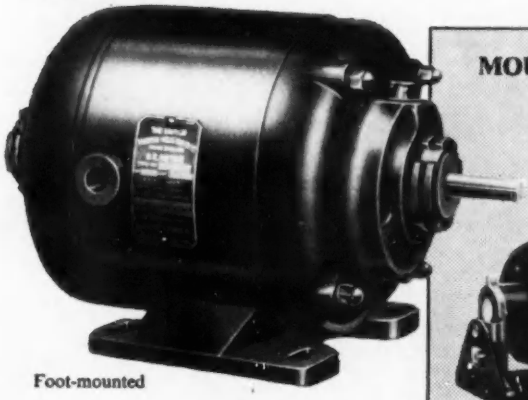

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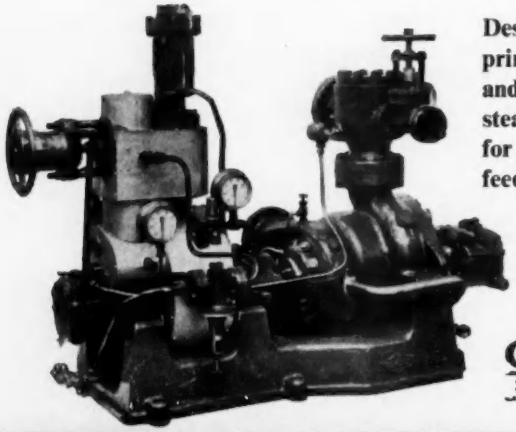

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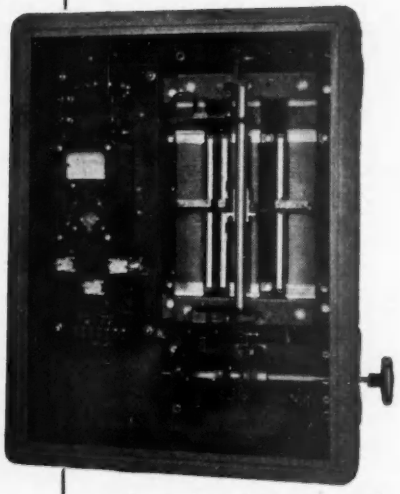

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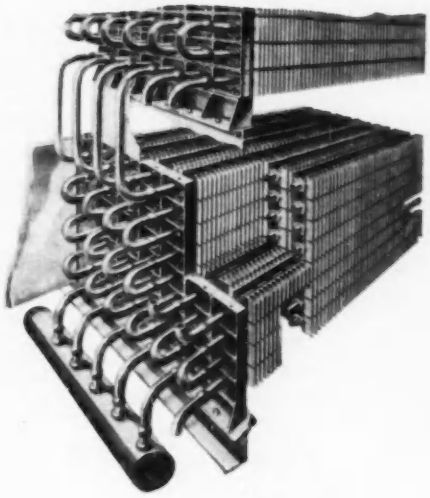

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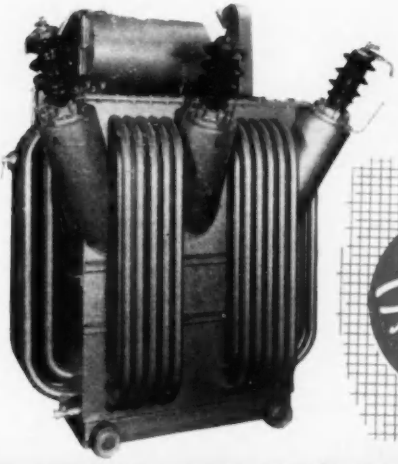

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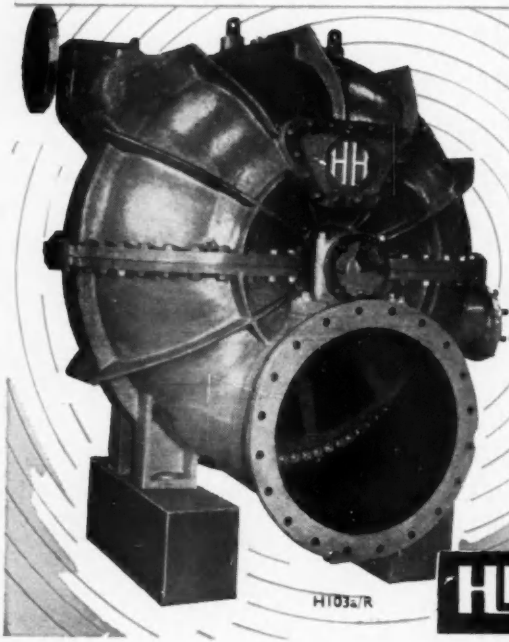

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